98TH CONGRESS
1st Session

HOUSE OF REPRESENTATIVES

REPORT
No. 98-81

DEPARTMENT OF ENERGY CIVILIAN RESEARCH AND DEVELOPMENT AUTHORIZATION ACT FOR FISCAL YEAR 1984

MAY 3, 1983.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. FUQUA, from the Committee on Science and Technology, submitted the following

REPORT

together with

ADDITIONAL AND MINORITY VIEWS

[To accompany H.R. 2587]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology, to whom was referred the bill (H.R. 2587) to authorize appropriations to the Department of Energy for civilian research and development programs for the fiscal year 1984, and for the continuation in fiscal year 1984 of prior year research and development projects, having considered the same, report favorably thereon with amendments and recommend that the bill as amended do pass.

CONTENTS

Page
Amendments ... 1
- I. Background of bill ... 2
- II. Hearings ... 3
- III. Summary of committee actions ... 6
- IV. Explanation of the programs contained in H.R. 2587 ... 15
  - A. Fossil Energy ... 15
  - B. Energy Conservation ... 30
  - C. Energy Supply R&D ... 40
    - 1. Solar Energy ... 40
    - 2. Geothermal Energy ... 49
    - 3. Nuclear Fission ... 51
    - 4. Magnetic Fusion ... 63

19-900 O

H703-4

	Page
5. Electric Energy Systems	66
6. Energy Storage Systems	68
7. Small-Scale Hydroelectric Systems	70
8. Supporting Research and Technical Analysis, including basic energy sciences, energy science advanced computation, energy research analysis, university research support, university research instrumentation, and advisory and oversight program direction	71
9. Environmental R&D	79
10. Policy and management, energy research	87
D. Geothermal resources development fund	89
E. General Science and Research	90
1. High energy physics	90
2. Nuclear physics	93
F. Uranium Enrichment	96
V. Effect of legislation on inflation	99
VI. Committee oversight findings and recommendations	99
VII. Summary of Government Operations Committee findings and recommendations	99
VIII. Budget Analysis and Projection	99
IX. Congressional Budget Office estimates and comparisons	99
X. Changes in existing law	101
XI. Committee Recommendation	101
XII. Minority and additional views	102

The amendments are as follows:

On page 2, line 6, strike "$491,822,000" and insert in lieu thereof "$495,822,000, including $2,000,000 for a research, development program to decontaminate the W. R. Grace site and vicinity properties in the Wayne/Pequannock, New Jersey area";

On page 3, line 16, strike "$31,160,000" and insert in lieu thereof "$33,160,000";

On page 6, line 8, strike "$1,600,000" and insert in lieu thereof "$3,600,000"; on line 9, strike "$13,600,000" and insert in lieu thereof "$15,600,000"; on line 12, strike "$4,400,000" and insert in lieu thereof "$3,200,000"; on line 13, strike "$11,600,000" and insert in lieu thereof "$10,400,000"; strike all of lines 18 through 20, and reletter the succeeding paragraphs accordingly; and

On page 11, strike all of lines 22 through 24, and insert in lieu thereof the following:

> (c) No funds are authorized to be appropriated pursuant to this Act, or pursuant to the provisions of chapter 1 of subtitle A of title X of the Omnibus Budget Reconciliation Act of 1981 which relate to fiscal year 1984, for the continuation or termination of the Clinch River Breeder Reactor Project, except to such extent as may be specifically provided by legislation enacted after the date of the enactment of this Act.

I. BACKGROUND OF THE BILL

The fiscal year 1984 Department of Energy budget was submitted to the House of Representatives on January 31, 1983 by President Reagan. The formal authorization request in bill form for the DOE civilian programs was submitted on March 9, 1983.

On April 19, 1983, Chairman Don Fuqua introduced a bill H.R. 2587, to authorize appropriations to the Department of Energy for civilian research and development programs and projects for fiscal year 1984. This bill was referred to the Committee on Science and Technology.

Extensive Subcommittee hearings were held during February and March 1983 on the Department of Energy authorization requests. On April 21, April 26 and April 27, 1983, the Committee met to mark-up the bill. After completing this action, the Committee reported the bill, H.R. 2587, as amended, on April 27, 1983 by a recorded vote, 26 yeas and 15 nays.

II. HEARINGS

A. Committee on Science and Technology

On February 8, 1983, the Committee on Science and Technology held a hearing to receive testimony from the Department of Energy on its fiscal year 1984 budget request. Hon. Donald Paul Hodel, Secretary, Department of Energy, accompanied by Ms. Martha Hesse, Assistant Secretary for Management and Administration, and Ms. Elizabeth Smedley, Acting Deputy Controller, testified in support of the budget submitted by the President for fiscal year 1984.

B. Subcommittee on Energy Development and Applications

The Subcommittee on Energy Development and Applications held hearings on the fiscal year 1984 Department of Energy (DOE) authorization for fossil energy, solar energy, energy conservation, supporting research and general science programs on February 8, 24, and March 2, 3, 8, 9, 10, 14, 15, 16, 17, 1983.

DOE officials who testified included: Hon. Donald Paul Hodel, Secretary of Energy; Ms. Martha Hesse, Assistant Secretary for Management and Administration; Dr. Alvin W. Trivelpiece, Director of the Office of Energy Research; Mr. Jan Mares, Assistant Secretary for Fossil Energy; Mr. Joseph Tribble, Assistant Secretary for Conservation and Renewable Energy.

In addition, the following citizens testified: Dr. Ivan Bennett, Vice Chairman of the Energy Research Advisory Board; Mr. Grant Thompson, Chairman of the Conservation Panel of the Energy Research Advisory Board; Ms. Victoria Tschinkel, Chairman of the Solar Research and Development Panel of the Energy Research Advisory Board; Dr. William F. Brinkman, Director of the Physical Research Laboratory of Bell Laboratories; Dr. Alan Schriesheim, General Manager of the Engineering Technology Department of Exxon Research and Engineering Company; Dr. Robert M. Rosenzweig, President of the Association of American Universities; Dr. Nicholas P. Samios, Director of Brookhaven National Laboratory; Dr. David Shirley, Director of Lawrence Berkeley National Laboratory; Dr. Alexander Zucker, Associate Director of Oak Ridge National Laboratory; Dr. James D. Bjorken, Senior Scientist of Fermi National Accelerator Laboratory; Dr. Burton Richter, Technical Director of the Stanford Linear Accelerator Center; Mr. Thomas Vonier of Thomas Vonier Associates, Inc.; Mr. Frank Kensill of the Institute for Human Development; Mr. Donald Carter of the American Consulting Engineers Council; Dr. Thomas J. Wilbanks, Associate Director of the Energy Division of Oak Ridge National Laboratory; Mr. Bradford Chase, Acting Under Secretary for Energy of the State of Connecticut; Mr. Craig Marks, Executive Director of the

Environmental Activities Staff of the General Motors Technical Center; Dr. Lawrence Papay of Southern California Edison; Mr. Bobby S. Tharpe of the General Electric Company; Mr. Byron Washom of Avanco Corporation; Mr. Arthur Jackson of Hamilton Standard Corporation; Dr. Leslie S. Levine of Jaycor; Dr. Patrick Takahashi of the University of Hawaii; Dr. Charles W. Berge of Grace Geothermal Corporation; Mr. David O. Webb, Vice President of the Gas Research Institute for Washington Operations; Mr. George Lawrence, President of the American Gas Association; Mr. Barnard S. Lee, President of the Institute of Gas Technology; Mr. Tobias Anthony, Director of Business Development and Washingon Affairs for Research-Cottrell, Inc.; Dr. Michael Massey of Environmental Research and Technology, Inc.; Mr. William N. Irving, Vice President of Charles T. Main, Inc.; Mr. Dwain F. Spencer, Director of the Advanced Power Systems Division of the Electric Power Research Institute; Mr. Peter M. Schwolsky, Washington Representative of the Electric Power Research Institute; Dr. Charles E. Kolb, Vice President of the Applied Research Division of Aerodyne Research, Inc.; Dr. Eric Leber of the American Public Power Association; and Mr. Malcom Jones of Ebasco Services, Inc.

C. Subcommittee on Natural Resources, Agriculture Research and Environment

The Subcommittee on Natural Resources, Agriculture Research and Environment held program review hearings on March 3 and April 19, 1983. A budget authorization hearing was held April 20, 1983.

DOE officials who testified included: Dr. Alvin Trivelpiece, Director, Office of Energy Research; Dr. Charles Edington, Associate Director, Office of Biological and Environmental Research; and Mr. Robert W. Davies, Deputy Assistant Secretary, Environment, Safety and Health.

In addition to DOE officials, testimony was also received from: Dr. Richard Griesemer, Oak Ridge National Laboratory; Dr. Roger McClellan, Lovelace Inhalation Toxicology Research Institute; Dr. Richard Setlow, Brookhaven National Laboratory; and Dr. Harvey Herschman, U.C.L.A.

D. Subcommittee on Energy Research and Production

The Subcommittee on Energy Research and Production held hearings on the FY 1984 Department of Energy budget request for nuclear fission, uranium enrichment, magnetic fusion, electric energy systems, energy storage systems, and small-scale hydroelectric programs. The hearings were held on February 22, 23 and 24, March 2, 8, 9, 10, 14, 15, 16 and 17, 1983.

DOE officials who testified included: Hon. Donald Paul Hodel, Secretary of Energy; Ms. Martha Hesse, Assistant Secretary for Management and Administration; Dr. Alvin W. Trivelpiece, Director of the Office of Energy Research; Dr. Shelby T. Brewer, Asst. Secretary for Nuclear Energy; Mr. William R. Voight, Deputy Assistant Secretary for Uranium Enrichment & Assessment; Mr. Gordon L. Chipman, Jr., Dep. Asst. Secty. for Breeder Reactor programs; Mr. Joseph J. Tribble, Assistant Secretary for Conservation and Renewable Energy; and Mr. Kermit O. Laughon, Sr., Director of the Office of Spent Fuel Management and Reprocessing Systems.

In addition to DOE officials, testimony was also received from: Dr. John Yasinsky, General Manager, Advanced Power Systems Division of Westinghouse Electric Corporation; Mr. John Taylor, Director of the Nuclear Power Division of the Electric Power Research Institute; Dr. R. B. Richards, General Manager, Advanced Reactor Systems Department of the General Electric Company; Mr. John J. Kearney, Sr., Vice President of the Energy & Environmental Activities of the Edison Electric Institute; Mr. Robert D. Partridge, Vice President of the National Rural Electric Cooperative Association; Dr. Alvin Weinberg, Institute for Energy Analysis; Mr. S. Jacob Scher, Natural Resources Defense Council representing the Taxpayers Coalition Against Clinch River; Dr. E. Linn Draper, Jr., Sr. Vice President, External Affairs of the Gulf States Utilities Company representing the American Nuclear Energy Council and the Edison Electric Institute; Dr. Thomas A. Cotton, Senior Analyst of the Office of Technology Assessment; Dr. Raul A. Deju, Director, Basalt Waste Isolation Project of the Rockwell International Corporation; Mr. John E. Gray, Chairman, International Energy Associates Limited; Mr. Vincent S. Boyer, Sr. Vice President of Nuclear Power of the Philadelphia Electric Company; Dr. Jack L. Kerrebrock, Associate Administrator, Office of Aeronautics & Space Technology of NASA; Dr. Robert S. Cooper, Director for the Defense Advanced Research Projects Agency (DARPA); Dr. Donald Rea, Asst. Laboratory Director for Technology & Space Program Development of the Jet Propulsion Laboratory, California Institute of Technology; Mr. John E. Hanson, Program Manager for Space & Military Reactor Development, Los Alamos National Laboratory; Mr. R. F. Walker, Chairman of the Gas-Cooled Reactor Associates; Mr. Harold M. Agnew, President of GA Technologies, Inc.; Mr. R. B. Richards, General Manager, Advanced Reactor Systems Department of the General Electric Company; Mr. Robert E. Uhrig, Vice President of Florida Power and Light Company; Dr. William M. Jacobi, General Manager, Nuclear Fuel Division of Westinghouse Electric Corporation; Mr. Charles W. Pryor, Manager, Nuclear Fuel Services Department of Babcock & Wilcox Company; Mr. Robert C. Arnold, President of GPU Nuclear; Mr. Ray Mairson of Westinghouse Electric Corporation; Dr. J. Robert Merriman, Director of Enrichment & Technology of the Union Carbide Corporation, Nuclear Division; Mr. Kenneth Matson, Vice President, Public Service Electric and Gas Research Corporation and Chairman, Policy Panel of the Atomic Industrial Forum's Committee on Fusion; Dr. Harold Agnew, President of GA Technologies, Inc.; Dr. Stephen O. Dean, President of Fusion Power Associates; Hon. Mike McCormack, Energy Consultant; Dr. Allan T. Mense, Sr., Scientist, Fusion Science Division of McDonnell Douglas Astronautics Co. representing the Institute of Electrical & Electronics Engineers, Inc.; Dr. J. Leon Shohet, Professor and Director, Torsatron/Stellarator Laboratory, University of Wisconsin—Madison; Professor John M. Dawson, Director, Center for Plasma Physics and Fusion Engineering, University of California at Los Angeles; Dr. William E. Drummond, Director, Fusion Research Center, University of Texas at Austin; Mr. Arnold Fickett, Director, Advanced Conversion and Storage, Electric Power Research Institute; Mr. Lowell Endall, Manager, Research and Technological Development, National Rural Electric Cooperative Association; Mr. Donald J. Helfrecht, President of the Madison Gas and Electric Company; Mr. Lester H. Fink, President, Systems Engineering for Power, Inc., representing Institute of Electrical and Electronics Engineers, Inc.; Hon. Fortney H. (Pete) Stark (D-CA), U.S. House of Representatives; Dr. Ronald C. Davidson, Director of the Plasma Research Center, Massachusetts Institute of Technology; and Dr. Herbert H. Woodson, Director, Center for Energy Studies of the University of Texas at Austin.

E. SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS

The Subcommittee on Transportation, Aviation and Materials held budget authorization hearings on February 23 & 24, 1983 on the Department of Energy's Transportation Programs.

Witnesses included:

Mr. Joseph J. Tribble, Assistant Secretary, Office of Conservation and Renewable Energy, U.S. Department of Energy.

Mr. Noel Nightingale, Program Manager, Automotive Stirling Engine Development Program, Mechanical Technology Incorporated; accompanied by: Dr. Lloyd R. Lawrence, Jr., Director for Technical Development; and Mr. Bruce Goldwater, Assistant General Manager, Stirling Engine Systems Division.

Mr. John Boppart, Vice President of Engineering, Garrett Turbine Engine Company, The Garrett Corporation.

Dr. Ian Macpherson, Director, Powertrain Research Laboratory, Ford Motor Company.

Mr. Harlod E. Helms, Acting Chief Engineer, Advanced Gas Turbines, Detroit Diesel Allison Division, General Motors Corporation.

III. SUMMARY OF COMMITTEE ACTIONS

[In thousands of dollars]

	Fiscal year 1983 budget authority (estimate)	Fiscal year 1984 DOE request	Committee action	
			Changes to DOE request	Total authorization
Fossil energy:				
Operating expenses	308,550	131,460	+172,430	303,890
Capital equipment	0	1,500	0	1,500
Construction	2,800	5,040	0	5,040
Total, fossil energy	311,350	138,000	+172,430	310,430
Energy conservation:				
Operating expenses	124,530	58,477	+73,903	132,380
Capital equipment	0	0	+750	750
Construction	0	9,000	0	9,000
Total, conservation	124,530	67,477	+74,653	142,130
Energy supply R&D:				
Solar energy:				
Operating expenses	188,535	83,309	+114,041	197,350
Capital equipment	400	250	−250	0
Construction	0	0	+1,500	1,500
Total, solar energy	188,935	83,559	+115,291	198,850

III. SUMMARY OF COMMITTEE ACTIONS—Continued

[In thousands of dollars]

	Fiscal year 1983 budget authority (estimate)	Fiscal year 1984 DOE request	Committee action	
			Changes to DOE request	Total authorization
Geothermal energy:				
Operating expenses	22,358	13,553	+16,400	29,953
Capital equipment	250	0	0	0
Construction	27,020	0	0	0
Total, geothermal	49,628	13,553	+16,400	29,953
Nuclear fission:				
Operating expenses	499,757	439,522	+56,300	495,822
Capital equipment	32,690	31,160	+2,000	33,160
Construction	26,100	13,500	0	13,500
Total, nuclear fission	558,547	484,182	+58,300	542,482
Magnetic fusion energy:				
Operating expenses	361,562	392,700	+33,000	425,700
Capital equipment	39,500	37,800	0	37,800
Construction	46,000	36,500	0	36,500
Total, magnetic fusion	447,062	467,000	+33,000	500,000
Electric energy systems:				
Operating expenses	17,200	12,702	+8,000	20,702
Capital equipment	0	0	+500	500
Total, electric energy systems	17,200	12,720	+8,500	21,202
Energy storage systems:				
Operating expenses	25,700	14,200	+11,000	25,200
Capital equipment	0	0	+500	500
Total, energy storage systems	25,700	14,200	+11,500	25,700
Small-scale hydroelectric systems: Operating expenses, total	1,000	0	0	0
Supporting research and technical analysis:				
Basic energy sciences:				
Operating expenses	261,294	295,830	0	295,830
Capital equipment	18,156	24,280	0	24,280
Construction	3,400	30,060	−5,000	25,060
Total, basic energy sciences	282,850	350,170	−5,000	345,170
Other supporting research and technical analysis:				
Operating expenses	11,427	17,739	+5,000	22,739
Construction	34,000	40,600	0	40,600
Total, other supporting research	45,427	58,339	+5,000	63,339
Total, supporting research and technical analysis	328,277	408,509	0	408,509
Environmental R&D:				
Operating expenses	211,738	200,275	+52,950	253,225
Capital equipment	13,477	9,300	+3,825	13,125
Construction	2,000	1,000	0	1,000
Total, environmental R&D	227,215	210,575	+56,775	267,350
Policy & management, energy research: Operating expenses, total	1,250	515	0	515
Subtotal, energy supply R&D	1,844,814	1,694,795	+299,766	1,994,561

III. SUMMARY OF COMMITTEE ACTIONS—Continued

[In thousands of dollars]

	Fiscal year 1983 budget authority (estimate)	Fiscal year 1984 DOE request	Committee action	
			Changes to DOE request	Total authorization
Geothermal Resources Development Fund (GRDF): Operating expenses, total	75	2,100	0	2,100
General science and research:				
Program direction, operating expenses	1,413	2,250	0	2,250
High energy physics:				
Operating expenses	320,274	349,500	0	349,500
Capital equipment	46,372	51,500	0	51,500
Construction	55,500	89,000	0	89,000
Total, high energy physics	422,146	490,000	0	490,000
Nuclear physics:				
Operating expenses	112,365	128,000	0	128,000
Capital equipment	10,444	11,300	0	11,300
Construction	7,700	13,700	0	13,700
Total, nuclear physics	130,509	153,000	0	153,000
Total, general science and research	554,068	645,250	0	645,250
Uranium enrichment R&D:				
Operating expenses	133,433	166,300	+11,000	177,300
Capital equipment	6,300	12,900	0	12,900
Construction	900	3,600	0	3,600
Total, uranium enrichment R&D	140,633	182,800	+11,000	193,800
Total, H.R. 2587:				
Operating expenses	2,602,461	2,308,432	+554,024	2,862,456
Capital equipment	167,589	179,990	+7,325	187,315
Construction	205,420	242,000	−3,500	238,500
Total, DOE R&D authorization	2,975,470	2,730,422	+557,849	3,288,271

FOSSIL ENERGY: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $310,430,000 for fossil energy research and development programs, which is an increase of $172,430,000 over the Administration's request.

A. Operating expenses

In the specific subprograms, the Committee acted as follows:

1. Control technology.—Increased the Administration's request by $10,750,000 to maintain the fiscal year 1983 level of activity.

2. Advanced research and technology development.—Increased the Administration's request by $19,000,000 to increase the level of basic research activities.

3. Coal liquefaction.—Increased the Administration's request by $20,400,000 to maintain the level of fiscal year 1983 activity.

4. Combustion systems.—Increased the Administration's request by $8,300,000 to continue the program, although at a reduced level from the previous year.

5. *Fuel cells.*—Increased the Administration's request by $17,000,000 to continue the phosphoric acid program and maintain the molten carbonate and solid oxide programs.

6. *Heat engines and heat recovery.*—Increased the Administration's request by $5,000,000 to develop the coal-fired turbine and diesel programs in addition to fundamental combustion engineering activities.

7. *Underground coal gasification.*—Increased the Administration's request by $4,500,000 for a full seam test of the Controlled Retracting Injection Point technology and additional supporting basic research.

8. *Magnetohydrodynamics (MHD).*—Provided $30,000,000 to continue the level of activity in the MHD program although the Administration requested no funding for program.

9. *Surface coal gasification.*—Increased the Administration's request by $13,140,000 to continue operating advanced gasifier facilities, support monitoring the Great Plains gasification project and related activities.

10. *Advanced process technology.*—Increased the Administration's request by $2,100,000 for fundamental supporting research activities which crosscut the petroleum and gas programs.

11. *Enhanced oil recovery.*—Decreased the Administration's request by $2,450,000 which maintains heavy oil and tar sands activities at fiscal year 1983 levels while expanding university research on light oil recovery.

12. *Oil shale.*—Increased the Administration's request by $2,200,000 to provide additional funding for R&D in the cascading bed retort concept.

13. *Unconventional gas recovery.*—Increased the Administration's request by $8,500,000 to maintain the prior year level of activity in this program.

14. *Fossil energy program direction.*—Increased the Administration's request by $33,990,000 to provide for the personnel and indirect costs at the Energy Technology Centers.

ENERGY CONSERVATION: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $142,130,000 for energy conservation programs, which is an increase of $74,653,000 over the Administration's request.

A. *Operating expenses*

In the specific subprograms, the Committee acted as follows:

1. *Building and community systems.*—Increased the Administration's request by $21,115,000 for activities in building systems, community systems, urban waste, building equipment and program direction.

2. *Industrial energy conservation.*—Increased the Administration's request by $15,767,000 for waste energy reduction, industrial process efficiency, cogeneration and program direction.

3. *Transportation.*— Increased the Administration's request by $27,143,000 for activities in vehicle propulsion RD&D, including gas turbines, Stirling engines and supporting technology.

4. Multi-sector.—Increased the Administration's request by $9,878,000 for energy conservation technologies and energy-related inventions.

B. Plant and capital equipment

The Committee provided $500,000 for capital equipment in the building systems subprogram and $250,000 for capital equipment in the multi-sector program although the Administration requested no funds.

SOLAR ENERGY: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $198,850,000 for solar energy programs, which is an increase of $115,291,000 over the Administration's request.

A. Operating expenses

In the specific subprograms, the Committee acted as follows:

1. Photovoltaics energy systems.—Increased the Administration's request by $24,500,000 for technology development, systems engineering and standards, and tests and applications.

2. Solar thermal energy systems.—Increased the Administration's request by $37,675,000 for parabolic dish and central receiver technology development and systems testing, and for research and advanced development.

3. Solar building energy research.—Increased the Administration's request by $14,125,000 for component and materials R&D and for whole building and system performance R&D.

4. Wind energy systems.—Increased the Administration's request by $13,400,000 primarily for MOD-5 design and testing.

5. Biomass and alcohol fuels.—Increased the Administration's request by $12,000,000 for feedstock development, regional programs and thermochemical conversion.

6. Ocean energy systems.—Provided $7,500,000 for open-cycle system R&D although the Administration requested no funding.

7. Program direction.—Increased the Administration's request by $2,841,000.

8. Solar program support.—Provided $1,000,000 although the Administration requested no funding.

9. Solar energy research institute.—Provided $1,000,000 to design a permanent laboratory facility.

B. Plant and capital equipment

The Committee reduced capital equipment for solar thermal energy systems by $250,000 and provided $1,500,000 to design standardized equipment for the next five megawatt increment (Phase III) of the SMUD project.

GEOTHERMAL ENERGY: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $29,953,000 for geothermal research and development activities, which is an increase of $16,400,000 over the Administration's request.

A. Operating expenses

In the specific subprograms, the Committee acted as follows:

1. *Hydrothermal industrialization.*—Recommended no additional funding since DOE will have $64,500,000 in previously appropriated funds to continue the demonstration plant in Heber, California.

2. *Geopressured resources.*—Increased the Administration's request by $8,000,000 to continue the well testing program and initiate a new design test well.

3. *Geothermal technology.*—Increased the Administration's request by $8,400,000 to continue the hot dry rock and hydrothermal research activities.

NUCLEAR FISSION: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $542,482,000 for the nuclear fission program which is an increase of $58,300,000 over the Administration's request.

A. Operating expenses

In the specific subprograms, the Committee acted as follows:

1. *Converter reactor systems.*—Increased the Administration's request by $39,500,000 for activities associated with the high temperature gas-cooled reactor program and the light water reactor systems program.

2. *Commercial waste management.*—Increased the Administration's request by $5,300,000 for activities in terminal isolation R&D and waste systems technology.

3. *Nuclear fuel cycle R&D.*—Increased the Administration's request by $13,500,000 for research activities associated with fuel reprocessing.

4. *Advanced nuclear systems.*—Redirected up to $250,000 of funding within the Space Nuclear Reactor Power program to support planning activities related to the follow-on ground engineering phase.

5. *Breeder reactor systems.*—Reduced the Administration's request by $2,000,000 as a general reduction to the breeder base technology program. Accepted an amendment that denies federal funding for fiscal year 1984 for the Clinch River Breeder Reactor (CRBR) project, pending Congressional enactment of legislation providing an alternative financing plan for the project. Redirected $1,000,000 within the Water Cooled Breeder program for the purpose of establishing a technology transfer activity.

B. Plant and capital equipment

The Committee increased the Administration's request by $2,000,000 for capital equipment not related to construction for the High Temperature Gas-Cooled Reactor (HTGR) program activities in Converter Reactor Systems.

MAGNETIC FUSION: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $500,000,000 for the magnetic fusion program, which is an increase of $33,000,000 over the Administration's request.

A. Operating expenses

In the specific subprograms, the Committee acted as follows:

1. Applied plasma physics.—Increased the Administration's request by $2,500,000 million to enhance work at the Los Alamos Laboratory.

2. Confinement systems.—Increased the Administration's request by $14,500,000 to support mainline projects as well as provide for reorientation in some areas.

3. Development and technology.—Increased the Administration's request by $6,000,000 million for acceleration of the Ion Cyclotron Resonance Heating (ICRH) activity.

4. Planning and projects.—Increased the Administration's request by $10,000,000 million for several activities.

ELECTRIC ENERGY SYSTEMS AND ENERGY STORAGE SYSTEMS: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $46,902,000 for electric energy and energy storage systems which is an increase of $20,000,000 over the Administration's request.

A. Operating expenses

1. Electric energy systems.—The Committee increased the Administration's request by $8,000,000 for additional research and development work in seven specified areas.

2. Energy storage systems.—The Committee increased the Administration's request by $11,000,000 to conduct work in six specified activities.

B. Plant and capital equipment

The Committee provided $500,000 for capital equipment not related to construction for the Electric Energy Systems program and $500,000 for capital equipment not related to construction for the Energy Storage Systems program.

SUPPORTING RESEARCH AND TECHNICAL ANALYSIS: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $408,509,000 to support basic research to broaden the technology base for present and future energy technologies.

A. Operating expenses

In the specific subprograms, the Committee acted as follows:

1. University research support.—Increased the Administration's request by $1,000,000 to reestablish the graduate traineeship program initiated in fiscal year 1982, but not funded in fiscal year 1983.

2. Energy science advanced computation.—Created this new budget line and provided $4,000,000 for advanced computational resources (Class VI Computers) for research supported by DOE's Office of Energy Research.

B. Construction and capital equipment

1. Basic energy sciences.—The Committee reduced construction funding by $5,000,000 for project 84-ER-112, National Center for Advanced Materials, Lawrence Berkeley Laboratory and Stanford Linear Accelerator Center.

2. Multiprogram general purpose facilities.—The Committee agreed with the Administration's request for $40,600,000, but redirected $2,000,000 for Project 81-E-325, Energy Technology Laboratory at Sandia National Laboratory, Albuquerque.

ENVIRONMENTAL R&D: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $267,350,000 for environmental programs, which is an increase of $56,775,000 over the Administration's request.

A. Operating expenses

In the specific subprograms, the Committee acted as follows:

1. Environment, safety and health.—Increased the Administration's request by $1,600,000 to enhance research and development in hazardous and toxic activities (operational safety) and environmental compliance.

2. Biological/environmental research.—Increased the Administration's request by $51,350,000 to conduct meaningful research activities in areas of human health/cancer, toxic and genetic effects, nuclear medicine and carbon cycle studies. The Committee also stipulated that $4,000,000 of funding provided be used for risk analysis.

B. Plant and capital equipment

The Committee increased the Administration's request by $3,825,000 to replace and update emergency equipment in the environment, safety and health subprogram.

GENERAL SCIENCE AND RESEARCH: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $645,250,000 for general science and research, which is in agreement with the Administration's request. However, the Committee recommended up to $10 million be made available from this total for construction activities on the Colliding Beam Accelerator (CBA) facility at Brookhaven National Laboratory should the High Energy Physics Advisory Panel report favorably on the CBA.

URANIUM ENRICHMENT: SUMMARY OF COMMITTEE ACTIONS

The Committee authorized a total of $193,800,000 for research and development activities in the Uranium Enrichment program which is an increase of $11,000,000 over the Administration's request.

A. Operating expenses

In the specific subprograms, the Committee acted as follows:

1. Gas centrifuge operations and support.—Process Development and Demonstration and Supporting Services. Increased the Administration's request by $11,000,000 for Advanced Machine Development.

IV. EXPLANATION OF THE PROGRAMS CONTAINED IN H.R. 2587

A. Fossil Energy

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Control technology and coal preparation	$27,900	$17,050	$10,750	$27,800
Advanced research and technology development	33,150	24,000	+19,000	43,000
Coal liquefaction	37,600	17,000	+20,400	37,400
Combustion systems	24,200	8,400	+8,300	16,700
Fuel cells	30,050	9,500	+17,000	26,500
Heat engines and heat recovery	5,000	1,000	+5,000	6,000
Underground coal gasification	6,000	2,000	+4,500	6,500
Magnetohydrodynamics	29,000	0	+30,000	30,000
Surface coal gasification	39,000	16,900	+13,140	30,040
Program direction	31,900	7,060	27,240	34,300
Subtotal, coal	263,800	102,910	150,330	258,240
Advanced process technology	5,000	2,900	+2,100	5,000
Enhanced oil recovery	6,500	11,250	−2,450	8,800
Oil shale	12,500	8,600	+2,200	10,800
Program direction	4,050	600	+3,600	4,200
Subtotal, petroleum	27,800	23,350	+5,450	28,800
Enhanced gas recovery	13,900	5,000	+8,500	13,500
Program direction	3,050	200	+3,150	3,350
Subtotal, gas	16,950	5,200	+11,650	16,850
Total operating expenses	308,550	131,460	+172,430	303,890
Capital equipment		1,500	0	1,500
Construction	2,800	5,040	0	5,040
Total program	311,350	138,000	+172,430	310,430

The United States relies upon fossil energy sources—coal, oil and natural gas—for more than ninety percent of its energy requirements. Petroleum and gas make up approximately eleven percent of the proven fossil fuel reserves of the United States, yet they provide about three fourths of the energy consumed from fossil energy resources. As conventional supplies of domestic oil and gas are depleted, the nation will look increasingly to coal as a primary source of energy. Since coal is the largest domestic fossil energy resource and is comparatively underutilized, it is vital that our nation enhance fossil energy research and development efforts to increase our use of coal, as well as to increase the availability of gas and petroleum resources.

Within the Department of Energy, the fossil energy activities are divided into three categories: (1) coal, (2) petroleum, and (3) gas. The Reagan Administration's budget proposal for fiscal year 1984 requested $109.45 million for coal research activities, $23.35 million for petroleum research activities, and $5.2 million for gas research activities, which totals $138 million for fossil energy R&D. This request represents a 56 percent reduction from the program's fiscal year 1983 appropriated level. The reduced level is based on the assumption that incentives are now adequate to stimulate private venture capital for fossil energy R&D. Testimony before the Subcommittee provided little evidence to support this assumption and a great deal of evidence to contradict it. Thus, the Subcommittee took action to restore the fossil energy program to a level comparable to the fiscal year 1983 appropriated level.

COMMITTEE VIEW

The Synthetic Fuels Corporation (SFC) is required by the Energy Security Act of 1980 to submit a comprehensive strategy to the Congress on June 30, 1984. The lower world price for oil and general world-wide recession of the last two years has dramatically changed the economic picture for rapid commercialization of synthetic fuel technologies. In 1980, the Synthetic Fuel Corporation was expected to provide only minimal assistance to eager private sector, commercial scale projects. The DOE demonstration program for new unproven technologies was expected to continue. This is no longer the case. Now, it appears that the SFC will have to provide considerably more assistance for projects that will range more widely in size, technology, and risk. In addition to the shift in the economic climate, and the termination of DOE demonstration activities, the SFC has also been extremely slow in implementing the statutory goals set for it.

Thus, the Committee is concerned that, due to budget reductions, the DOE role in economic analysis as well as research and development on synthetic fuels has been reduced to almost nothing. As a result, it is highly likely that no alternative analyses of the synthetic fuels industry will be available to the Congress when it must consider the SFC's report. To prevent such a situation, the Committee directs the Secretary of Energy to provide funds for such studies to be undertaken by independent analysts; further, he is directed to provide those studies to the relevant Committees of the House and Senate no later than June 30, 1984.

CONTROL TECHNOLOGY AND COAL PREPARATION

Economic and social barriers to a rapid, widespread replacement of oil by coal derive mainly from quality differences. Compared to oil and gas, coal is dirty. Additional costs are incurred in burning most United States' coals because of the presence of sulfur, or certain mineral constituents or trace elements. Mitigating these substances establishes specific requirements for environmental management, waste disposal, boiler design modifications, and ancillary equipment capacity. The ultimate cost of electricity or process heat is strongly dependent on technologies dealing with coal quality, environmental emissions, and waste disposal. A sound advanced technology base in the interdependent technologies of coal beneficiation, gas cleaning, and waste disposal is essential to critical economic and engineering analyses of site-specific coal utilization requirements.

The Subcommittee believes it is essential to upgrade the quality of U.S. coals and develop critical clean-up and control technologies through the proof-of-concept stage to provide an incentive for commercial by the private sector. The Subcommittee believes industry will not invest in needed long term cleanup R&D since changing regulations can render the resulting technologies obsolete and their investments fruitless and therefore federal funding is necessary in this area.

The control technology and coal preparation activity includes four subactivities: (1) coal preparation; (2) flue gas cleanup; (3) gas stream cleanup; and (4) cleanup base technology. The Administration's fiscal year 1984 request for the control technology and coal preparation activity totaled $17.05 million.

COMMITTEE ACTION

The Committee increased the Administration's request for control technology operating expenses by $10.75 million for a total of $27.8 million.

The Subcommittee added $3.0 million to the coal preparation program to bring it to a level of $8.0 million. At this funding level the program will continue bench scale research associated with physical and chemical cleaning of U.S. coals while simultaneously evaluating critical design and performance uncertainties in selected, high payoff areas. The Committee's recommendation includes $2.0 million to support coal research activities at the Carbondale Mining Technology Center at Carbondale, Illinois, and $1.2 million to maintain the coal preparation program at Ames National Laboratory.

The Committee added $2 million to the flue gas cleanup program to bring it to a level of $9.6 million. At this funding level, program activities will concentrate on continuing the development of combined (i.e. NO_x, SO_x, particulates, hydrocarbons) flue gas cleanup processes. The Committee recommended a redirection of up to $4 million to begin research and development activities on a combined 60 percent SO_x and 30 percent NO_x removal system for retrofit applications.

The Committee added $2.55 million to the gas stream cleanup program to bring it to a level of $7 million. At this funding level, activities can continue on the development of the required technology base in hot gas the cleanup for application to coal combustors and gasifiers used as an energy source for advanced power systems. The Committee recommends enhanced R&D efforts on particulates and alkali control technology for gasifier-turbine applications. This should include support for continued development of the high velocity, high temperature ceramic particle separator (HTPS) project.

The Committee added $3.2 million to the cleanup base technology program to restore activities to the fiscal year 1983 level and undertake new activities to enhance the technology base for solid waste removal. Coal combustion and conversion process waste products represent a major environmental impact associated with electrical generation and other direct and indirect uses of coal. Safe disposal and/or utilization of these by-products requires the understanding of their physical and chemical characteristics. The Committee's recommendation includes funds for continuing activities on recovery of metals and minerals from fly ash and coal waste.

The Committee encourages the Department of Energy to increase efforts to develop the technology necessary to utilize the large reserves of Illinois Basin Coal. In this research, development should be pursued through the pilot plant stage, rather than just the bench-scale level, thus making it more likely that private industry will be able to commercialize available processes.

ADVANCED RESEARCH AND TECHNOLOGY DEVELOPMENT

The Advanced Research and Technology Development (AR&TD) activity plays an important role in the Department's Fossil Energy program through development of the technology base in coal. Basic, applied, and exploratory high risk, potentially high payoff research at the Energy Technology Centers and National Laboratories, universities and industrial laboratories helps extend the fundamental scientific and engineering knowledge base providing ideas for new processes and technical breakthroughs in coal conversion and utilization.

The main objectives of the AR&TD activity are to:

Provide a focal point for governmental involvement in fundamental, exploratory, and advanced research on coal;

Explore new and advanced processes for converting coal to clean gaseous and liquid fuels and chemical feedstocks;

Develop a better understanding of coal liquefaction and gasification processes, coal chemistry and related process engineering sciences;

Expand the data base, understanding, and verified modeling capability covering those chemical and physical phenomena critical to the design and performance of improved coal combustion systems;

Improve operation of fossil fuel facilities through the better understanding of the behavior of materials and components;

Explore new materials, catalysts and electrolytes for fuel cell systems;

Provide assessment and coordination of research and environmental support to Fossil Energy advanced programs;

Coordinate the planning and development of a balanced Fossil Energy program;

Coordinate, assess and plan Fossil Energy advanced research including international and cross-cut activities.

To accomplish these objectives, the activity is divided into five functional areas: (1) processes, (2) utilization, (3) materials, components and instrumentation, (4) university coal research, and (5) program development and coordination. The Administration's fiscal year 1984 request for the AR&TD activity totaled $30.54 million.

COMMITTEE ACTION

The Committee increased the Administration's request for AR&TD operating expenses by $19.0 million for a total of $49.54 million. In addition, within the available funding the Committee has provided at least $2.5 million for private sector investigation of phosphoric acid advanced technology requirements that have been identified in the 4.8 MW experiment and in the 40 KW on-site technology development program.

The Committee added $5 million to the processes activity to bring it to a level of $12 million. The Committee's recommendation includes $6 million for advanced research in coal liquefaction; $4 million for advanced research in coal gasification; and $2 million to continue research on thermophysical properties of synthetic fuels. Within the funds provided for the process activity the Committee expects that information relevant to all coal liquefaction and gasification processes be in forms useful to engineers and scientists.

The Committee added $4.7 million to the direct utilization activity to bring it to a level of $9.5 million. At this funding level, the program will continue to provide for expanding the technology base required for increased utilization of coal including low ranked coals, chars, beneficiated coals, and coal-liquid mixtures. Included in the Committee's, recommendation is $0.5 million for the Sandia Combustion Research Facility.

The Committee added $4.5 million to the materials, components, and instrumentation activity to bring it to a level of $11.0 million. The Committee recommended combining the instrumentation activity with the materials and components activity identified in the Administration's budget. In addition, the Committee recommended $2.5 million for instrumentation activities to provide the generic, cross-cutting technology base to ensure adequate measurement systems for fossil energy processes and to collect data on pilot scale processes; $7.5 million to expand materials research efforts in areas of high temperature corrosion, hydrogen attack, slag interactions, alloys, and mechanisms of erosion and wear; and $1.0 million to conduct research on innovative component concepts, multiphase flow recycle systems and valve components.

The Committee added $3.3 million to program development and coordination to bring it to a level of $5.0 million. The Committee's recommendation includes headquarters support costs. In prior years the research programs have been taxed to support various studies and administrative costs associated with administering the AR&TD program. The Committee believes the administrative and support costs associated with administering an effective AR&TD program are justified and has added funds to this program for such purposes. Thus the Committee does not expect the R&D program funds to be used for any other purposes than those associated with the designated research projects.

The Committee added $1.5 million to the university coal research program for a total of $5.5 million to restore the program to the level which DOE requested of OMB.

The Committee agrees with the Administration's request for capital equipment and construction in the AR&TD program.

COAL LIQUEFACTION

The goal of the Coal Liquefaction program is to contribute to a data base that will facilitate the private sector's development of coal conversion processes for economical production of environmentally acceptable synthetic liquid fuels through generic R&D in high risk, long-term concepts that have potential for high payoff.

Products obtained from coal liquefaction processes can replace petroleum derived products as boiler fuel for utilities or be refined to transportation fuel, furnace oils, and chemical feedstocks. Coal is, by far, the largest domestic fossil energy resource available to the U.S. In order to meet the future energy requirements of this country, it will be necessary at some point to use this resource base to increase the supply of liquid fuels. With high uncertainty in supplies and prices in the international petroleum market, the private sector will not undertake the long range, high risk R&D required to develop these improvements—particularly in the absence of an existing industrial production capacity and market which can provide sufficient profit incentives.

The coal liquefaction actively includes three subactivities: (1) indirect liquefaction; (2) advanced process development; and (3) support studies/engineering evaluations. The Administration's fiscal year 1984 request for coal liquefaction totaled $17.0 million.

COMMITTEE ACTION

The Committee increased the Administration's request for coal liquefaction operating expenses by $20.4 million for a total of $37.4 million.

The Committee added $8.4 million to the indirect liquefaction program to restore it to the level which DOE requested of OMB, $12.4 million. At this funding level, the Committee recommended $6.4 million to continue the base research program; $1.5 million to support the methanol-to-gasoline pilot plant project in collaboration with the Federal Republic of Germany; and $4.5 million to continue the liquid phase methanol project which will provide the data essential to permit an evaluation by industry of this concept. The Committee was advised that absence of DOE share could seriously jeopardize continuation of the liquid phase methanol project as support by other private participants would be reduced or eliminated at this very crucial data gathering/decision making stage. The Committee also directs the Department to retain title to the facility at this time.

The Committee added $9 million to the advanced process development program to bring it to a level of $18 million. Included in the Committee recommendation is $8 million to support the Wilsonville pilot plant operation. The Committee believes government support of research and development is essential to evaluate technical feasibility and enhance private sector commercialization of liquefaction processes. The Committee expects work to continue in slurry phase (disposable) catalyst hydrogenation, process research, and technology development including proof-of-concept process studies.

The Committee added $3 million to the support studies/engineering evaluation projects to bring the activity to the level which DOE requested of OMB, $7.0 million. The Committee recommended up to $2 million to continue coal liquefaction data base activities at the Pittsburgh Energy Technology Center and $2 million to conduct environmental research in support of and coordinated with the Synthetic Fuel Corporation's activities for both direct and indirect liquefaction. The Committee supports enhanced efforts in health effects/environmental studies and activities related to data base management.

COMBUSTION SYSTEMS

The goal of the combustion systems program is to establish the technology base from which industry can develop and commercialize improved systems to increase the utilization of coal in an environmentally acceptable manner. Within this program, the development of methods to use coal as a replacement for oil and/or natural gas in utility, commercial and transportation applications is a major priority. For fiscal year 1984, the Administration budget request is $8.4 million.

COMMITTEE ACTION

The Committee increased operating expenses for combustion systems by $8.3 million for a total of $16.7 million. This action provides for the following:

1. $1.4 million for bench-scale atmospheric fluidized bed testing,
2. $6.0 million for pressurized fluidized bed combustion,
3. $1.7 million for advanced coal combustion technology, and
4. $7.6 million for alternate fuel utilization research.

The atmospheric fluidized bed increase will provide continued support for bench-scale testing of previously identified advanced AFB concepts which potentially have significant technical and economic advantages over esisting processes. No funding is recommended for operation of AFB demonstration units.

The pressurized fluidized bed program objective is to develop PFB combustion systems that achieve high efficiency and acceptable reliability and durability within desirable emission levels. The addition of $2.6 million is to provide funding for the Coal Utilization Research Laboratory at Leatherhead, England, and continued long term materials testing and alternate fuels research. The Committee feels that the DOE recommended reduced effort in PFB alternate fuels research would have eliminated study of coal-water combustion of lignite and other low ranked coals.

The advanced combustion technology program has the primary goal of retrofitting existing oil fired boilers for combustion of 100 percent coal, which the Committee supports as a step toward reducing petroleum imports. Additionally, it is felt that increased alternate fuel utilization funding of $3.6 million will accelerate the ability of the private sector to make practical commercialization decisions.

FUEL CELLS

Fuel cells are electrochemical conversion systems which are highly efficient, modular, and environmentally benign energy producing systems. They have the ability of producing electricity from a wide spectrum of fuels, including synthetic liquids and gases from coal, biomass and waste. In addition, on-site installations have the potential for meeting the consumers electrical and thermal requirements, thereby utilizing up to 85 percent of the energy available in the fuel. Ths Administration has requested $9.5 million for this program in fiscal year 1984.

COMMITTEE ACTION

The Committee increased operating expenses for fuel cells by $17.0 million for a total of $26.5 million. This action consists of a number of program increases.

During the past several years the Committee has made a clear commitment to continued research on multi-kilowatt phosphoric acid fuel cell systems, including utility-sized development and testing of these technologies. This year's action recognizes the completion of government participation in the 4.8 MW prototype demonstration unit in New York City. Yet, the Committee believes an increase of $14.0 million for a total of $17 million is required to maintain a consistent level of commitment, and give continued support to both the electric and gas utility R&D programs, to begin technology verification, and to continue on-site technical development. The following allocations are made: (1) $6 million for technology development of the water cooled system for electric utility applications; (2) a total of $6 million is authorized for the 40 kw on-site phosphoric acid technology development program co-funded with the gas industry; (3) $3.5 million continues technology development on the air-cooled system for electric utility applications; (4) $1.5 million is provided for the alternative on-site phosphoric acid fuel cell concept.

Additionally, the Committee judges an increase of $2.0 million appropriate for the Molten Carbonate Fuel Cell program. These fuel cells offer the promise of utilizing dirtier fuels at higher operating temperatures, thereby producing greater levels of efficiency while continuing to offer environmental advantages. This level of support will provide for cooperative MCFC development activities with several non-government research programs.

In the area of advanced concepts, the Committee believes an increase of $1.0 million will maintain an adequate level of research into the long range development of solid oxide fuel cells and the investigation of thermionics.

HEAT ENGINES AND HEAT RECOVERY

The goal of the heat engines and heat recovery program is to assist industry in the development of advanced stationary power systems with non-critical fuel utilization capabilities that are both economically and environmentally acceptable. These non-critical fuels include coal, coal-water slurries, coal-derived liquids and gases, and residual fuels. The Administration's request for fiscal year 1984 is $1.0 million.

COMMITTEE ACTION

The Committee increased operating expenses for the heat engines and heat recovery program by $5.0 million.

The Committee feels strongly that the DOE proposal to terminate this program by providing for only data summarizing activities in fiscal year 1984 is not in keeping with the goal of reducing national reliance on imported fuels. Therefore $5 million is supported for funding the combustion zone durability (CZD) and coal-fired turbine programs. The CZD program is directed toward the engineering of materials and coatings specifically for the hostile environments within the combustion zones of gas turbine and diesel engines. The coal-fired turbine program will investigate corrosion and wear problems associated with coal-slurry based fuels, as well as examining the products of combustion likely to result from turbine applications.

Also, the Committee added $1.0 million for the coal-fired diesel engine program which involves developing a new technological base for the use of a coal-based fuel directly in a diesel engine.

UNDERGROUND COAL GASIFICATION

Underground coal gasification (UCG) is an unconventional method to produce fuels by gasifying seams of coal "in-situ" without mining. This can include several related processes for converting coal, underground, to more easily recoverable gaseous fuels which can either be directly utilized or converted to other hydrocarbon products. This process offers the potential of significant energy recovery from coal deposits that are unmineable because of very thick overburdens or steeply dipping beds. The Administration has requested $2.0 million for the UCG program.

COMMITTEE ACTION

The Committee increased operating expenses for the Underground Coal Gasification program by $4.5 million.

The Committee has added $1.2 million for a total of $2.25 million to conduct a full-seam test utilizing the highly promising novel concept, the Controlled Retracting Injection Point (CRIP) process. To be conducted at Centralia, Washington, this effort will be cost shared by both gas and electric utility organizations, with technical support provided by the Lawrence Livermore National Laboratory.

Additionally, the Committee included $3.3 million for supporting basic research in underground coal gasification. This action acknowledges the exhibited high level of interest in UCG technology by several major energy companies, as well as the continued commitment to UCG research efforts by the utilities.

MAGNETOHYDRODYNAMICS

Magnetohydrodynamics (MHD) is a long range technology which offers the potential for electric generation from coal at high overall conversion efficiences and low environmental impact. In the MHD process, coal is burned in several stages to produce extremely high temperature combustion products which become ionized in the form of a plasma. This plasma, when passed through an intense magnetic field will result in a significant DC current flow. Subsequently, these combustion products can be used as the energy source for conventional steam turbine generation. The most promising MHD scenario involves retrofitting existing thermal generating plants with MHD front-end hardware. Once again, the Administration has proposed to close out the MHD program at the end of fiscal year 1983 by requesting no funds for this program in fiscal year 1984. It is the intention of the Committee that the magnetohydrodynamics research and development authorization for fiscal year 1984 be utilized by DOE to the maximum possible extent to maintain a vital MHD development program consisting of the essential program elements.

COMMITTEE ACTION

The Committee recommendation provides $30.0 million for the magnetohydrodynamics program.

The Committee intends that on-going MHD R&D activities be continued at the fiscal year 1983 levels of effort. In particular, the MHD program should continue key activities at the major MHD facilities. Within the total, funds are available to ship the superconducting magnet currently in storage at Argonne National Labortory to the Coal Fired Flow Facility and to install and operate the magnet at CFFF.

SURFACE COAL GASIFICATION

Coal gasification is one of the key technologies necessary to develop an effective synthetic fuel industry. The gas and electric utility industries strongly support continued research and process development activities in this program. Environmental concerns and identified toxicological problems associated with coal gasification require an extensive research and development effort at the precommercial level. The Committee believes it is essential to bring this technology to the near commercial stage. For fiscal year 1984 the Administration has requested $16.9 million for the surface coal gasification program.

COMMITTEE ACTION

The Committee increased operating expenses for the Surface Coal Gasification program by $13.14 million.

Within that amount, the Committee has added $0.95 million for Advanced Process Development (for a total of $4.95 million) to accelerate the establishment of a comprehensive technology data base for new gasifier concepts and gasification systems. Among the concepts considered should be those that utilize internal recirculation catalysts or carbon dioxide instead of steam.

An increase of $9.75 million has been made to the System Engineering Concepts program for a total of $16.65 million. This provides $3.0 million for the operation of the Mountain Fuels Entrained Bed gasifier, $6.5 million for fluid bed gasification at the

Waltz Mill facility, $3.0 million for operation of the Morgantown fixed bed gasifier, and $4.15 million for hot, dirty gas clean up materials studies. Within the funds provided for hot, dirty gas cleanup, up to $1.0 million is for studies using mixed metal oxide sorbents and other solid adsorbents to handle dusty and corrosive gases without conventional quenching.

The Committee believes an increase of $2.4 million, for a total of $5.4 million, is needed for Environmental and Engineering Analysis. This program funding level will include up to $2.0 million for environmental research in support of, and coordinated with SFC activities. Furthermore, up to $1.0 million is provided for component development of a liquid-sealed lockhopper system for feeding coal into high pressure gasification systems.

And finally $3.04 million is provided to meet fully the loan guarantee and project monitoring requirements of the Great Plains Gasification project.

ADVANCED PROCESS TECHNOLOGY

The advanced process technology program provides research and development leading to improved extraction, processing and utilization technologies for petroleum and gas programs. This program includes two subactivities: (1) advanced exploratory research which provides a variety of generic and fundamental supporting research activities (e.g. advanced extraction and advanced utilization research, chemical and physical phenomena underlying processes) crosscutting the petroleum and gas programs; and (2) arctic and offshore research where activities focus on the development of new sensors and instrumentation for use in severe and/or remote environments.

The Administration's fiscal year 1984 request for advanced process technology totaled $2.9 million.

COMMITTEE ACTION

The Committee increased the Administration's request for advanced process technology operating expenses by $2.1 million for a total of $5 million.

The Committee added $1.85 million to the advanced exploratory research program to bring it to a level of $4 million. The Committee believes this program, which provides for a variety of generic and fundamental supporting research activities which crosscut the petroleum and gas programs can lead to novel and innovative technologies for increased recovery/extraction of oil and gas. The Committee recommended $2.5 million to support the fundamental petroleum research; $1 million to support advanced extraction research; and $0.5 million to conduct the microbial EOR program.

The Committee added $0.25 million to the arctic and offshore research to restore it to the level which DOE requested to OMB, $1.0 million. The Committee supports the view held by university experts, government consultants and industry representatives that DOE funding is crucial in research areas related to deep sea and harsh arctic environments because the private sector will not provide a level of support adequate for national interest when the risks of doing R&D in harsh environments are extremely high and benefits uncertain.

ENHANCED OIL RECOVERY

The goal of the Enhanced Oil Recovery (EOR) program is to conduct generic technology base R&D activities and to assist industry in obtaining a better understanding of the mechanisms and behavior of advanced and novel EOR processes for heavy oil, light oil, and tar sands. Only one-quarter of the oil discovered to date has been produced. Even the most optimistic projections for future oil recovery estimate that nearly two-thirds of the discovered oil will not be recovered. At present, some of the most advanced, high efficiency EOR methods such as micellar-polymer for light oil and fireflooding for heavy oil/tar sands are not sufficiently understood to be used with any degree of confidence. Other futuristic approaches such as microbial EOR are only now in a conceptual stage. The EOR program supports long range, high risk R&D because the payoffs are too far in the future to attract adequate private venture capital.

The EOR program includes three subactivities: (1) heavy oil; (2) light oil; and (3) tar sands. The Administration's request for EOR totaled $11.25 million.

COMMITTEE ACTION

The Committee reduced the Administration's request for enhanced oil recovery operating expenses by $2.45 million.

The Committee recommended maintaining the fiscal year 1983 research funding level in the heavy oil program, $1.6 million, and in the tar sands program, $0.6 million. The Committee believes the funding levels are adequate to maintain minimum, though important long range/high risk technology base R&D activities to assist industry to obtain a better understanding of the mechanisms, behavior, and properties of heavy oil and tar sands leading to improved recovery efficiency. The Committee also suggested these activities should attract more private sector venture capital.

The Committee recommended $6.6 million for research in the light oil program, which is in line with the Administration's request. Improved recovery efficiency for light oil could add substantially to domestic crude oil reserves and thus the Committee agrees that fundamental research into the behavior and mechanisms of light oil EOR processes for chemical and gas miscible flooding should continue. The Committee also recommended an expansion of university research with a special emphasis on EOR methods such as micellar-polymer for light oil.

OIL SHALE

The oil shale resource in the United States in estimated to be about two trillion barrels of oil equivalent. The richest reserves of oil shale lie in the western states of Colorado, Utah and Wyoming in areas of high environmental sensitivity. Substantial lower quality resources also occur in the east. The potentially recoverable oil shale resource is much greater than all of the oil reserves of the

Middle East. However, none of this resource can yet be classified as reserves in the absence of demonstrated commercial performance of the first generation technologies now being implemented. This resource could easily support shale oil production on the order of millions of barrels per day, thereby contributing substantially to a reduction in imports, if technical, economic and environmental constraints can be overcome. Research activities in the oil shale program will provide the technology base for a future generation of oil shale processes which will be characterized by reduced environmental impacts and increased resource recovery capability.

The oil shale program includes two subactivities: (1) oil shale technology base; and (2) environmental mitigation. The Administration's request for oil shale totaled $8.6 million.

COMMITTEE ACTION

The Committee increased the Administration's request for oil shale operating expenses by $2.2 million for a total of $10.8 million.

The Committee agreed with the Administration's request of $4.3 million for the oil shale technology base program. The Committee recommended the rock fragmentation and instrumentation development projects be maintained at Los Alamos and Sandia Laboratories.

The Committee added $2.2 million to the environmental mitigation program to restore it to the level which DOE requested to OMB, $6.5 million. The Committee recommended at least $3 million be provided to Lawrence Livermore National Laboratory for R&D on the cascading bed retort concept. The Committee has heard testimony that environmental problems are a severe constraint to large scale oil shale production and thus deems it appropriate that federal funds be made available to conduct R&D and develop data necessary to assist industry mitigate environmental problems associated with shale retorting processes.

UNCONVENTIONAL GAS RECOVERY

The existence of vast quantities of domestic natural gas in deposits which are not, using current technology, economically or technically recoverable is widely accepted. A recent Department of Energy advisory group strongly recommended an active federal role in enhanced gas recovery. Additionally, there is strong gas industry support for an ongoing major government effort in this area. The Committee believes a good potential exists for greatly expanding domestic gas reserves, and that the probability that industry will actively seek to commercialize accomplished technologies at the earliest practical opportunity appears to be very high. The Administration has asked for $5.0 million for this program in fiscal year 1984.

COMMITTEE ACTION

The Committee increased operating expenses for the unconventional gas recovery program by $8.5 million for a total of $13.5 million.

To insure a balanced program, the Committee has provided a total of $3.5 million of additional support for the Eastern gas shales program to expand Devonian shale analysis at the Morgantown Energy Technology Center and to provide for an Eastern mineback facility.

It has also continued the Western fight sands program at $8.0 million to fund a multi-well test facility and an integrated supporting research effort including diagnostic instrumentation and modeling.

The Committee recognizes the immense potential gas deposits represented by deep source gas and methane hydrates, and has included $2.0 million for the environmental and advanced research program to expand research in these areas.

PROGRAM DIRECTION

Program direction is the account within Fossil Energy which provides funds for the headquarters personnel, including salaries, fringe benefits, travel, and other administrative and overhead costs. The Administration proposed $7.06 million for Coal program direction, $0.6 million for Petroleum program direction, and $0.2 million for Gas program direction.

COMMITTEE VIEWS

The multiprogram contractor-operated national laboratories of the Department of Energy have made signficant contributions to the fossil energy R&D program. These contributions range broadly: basic coal-related research, materials performance research, fracturing technology, process instrumentation development, new drilling technology. They have been a special resource for technical program management and policy formulation.

Throughout the recent period of budget reductions in fossil energy programs, the Committee has sought to retain a program that is balanced—among the various technologies, among the various performers of research, and across the R&D spectrum from basic research to technology development. The Committee approves of and has given guidance for a program weighted more heavily toward basic and applied research versus technology demonstration. This means that the role of universities and the multiprogram national laboratories is likely to increase relative to other performers.

The Committee has some concern about the extent to which not only the day-to-day project management but also the program management has shifted from DOE headquarters to the Energy Technology Centers (ETC's). The Committee supports decentralized program management, although there is considerable evidence that the present approach to the implementation of decentralization has resulted in the virtual emasculation of the program management role at DOE headquarters. The Committee is aware that the ETC's are also performers of research and in some areas have competed with the national laboratories for project funding. The Committee's actions in providing funds for specific national laboratory projects as well as for the indirect costs of the ETC's are intended to give the Department clear direction as to the Committee's support for both the national laboratories and the ETC's, as well as its intention to maintain and, in some cases, enhance the expertise at the laboratories.

COMMITTEE ACTION

The Committee has increased program direction funding for Fossil Energy by $33.99 million. This increase will provide $34.3 million for Coal program direction, $4.2 million for Petroleum program direction, and $3.35 million for Gas program direction.

In making these increases, the Committee expresses its concerns that many of the component programs within Fossil Energy would have been excessively taxed to provide supervisory services at the proposed funding level for program direction. Further, it is recognized that the program direction responsibilities of DOE have been shifted from headquarters to the various Energy Technology Centers. It is the desire of the Committee that the various component program elements be funded up to their authorized levels, and that program direction costs be accounted for adequately.

B. Energy Conservation

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Building and community systems	$33,200	$13,485	+$21,115	$34,600
Industrial energy conservation	26,200	10,433	+15,767	26,200
Vehicle and engine R&D	53,900	31,457	+27,143	58,600
Multisector	11,230	3,102	+9,878	12,980
Subtotal	124,530	58,477	+73,903	132,380
Capital equipment	0	0	+750	750
Construction	0	9,000	0	9,000
Total program	124,530	67,477	+74,653	142,130

Energy Conservation activities funded in the Committee authorization include basic and applied research on energy use in buildings; research and development on energy efficient equipment for buildings and community systems; development and testing of new techniques to recapture waste heat and improve process efficiency in industry; basic research on fundamental processes and materials (combustion, tribology, materials); vehicle and engine R&D; and a variety of information dissemination programs for the buildings and industrial sectors.

COMMITTEE VIEWS

The Committee is concerned about apparent delays in transferring funds to the national laboratories by the Department of Energy's conservation programs. These delays have reportedly placed in jeopardy the continuity of staffing and program activities at the laboratories.

The Committee directs the Department to authorize as soon as practicable all appropriated funds in the Energy Conservation programs. The Subcommittee also directs the Department to submit, within two months of enactment of the fiscal year 1984 Interior Appropriation or Continuing Resolution, a financial plan for each of the Energy Conservation research and development programs.

BUILDINGS AND COMMUNITY SYSTEMS

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Building systems	$13,400	$6,600	+$9,400	$16,000
Community systems	3,700	0	+3,500	3,500
Urban waste R&D	3,000	0	+2,000	2,000
Building equipment	10,600	5,250	+5,350	10,600
Program direction	2,500	1,635	+865	2,500
Subtotal	33,200	13,485	+21,115	34,600
Capital equipment			+500	500
Total program	33,200	13,485	+21,615	35,100

The Buildings and Community Systems Program consists of four main subprograms:

Building systems.—Basic and applied research on the energy characteristics of building components and materials and of whole buildings as systems. This subprogram includes whole building performance research related to the development of voluntary guidelines and rating systems and educational and technology transfer activities.

Community systems.—Research and technical assistance to communities on the development of community scale systems to improve energy efficiency and utilize waste energy.

Urban waste.—Research and development of new separation, preparation and conversion techniques to transform municipal waste into useful energy. Carried out in conjunction with the Biomass program in solar energy R&D.

Building equipment.—Research and development of improved efficiency appliances and heating systems, including heat pumps, combustion equipment, refrigeration systems and lighting systems.

COMMITTEE ACTIONS

The Committee added $21.6 million to the Administration's request of $13.4 million to restore the BCS program to a level of $35.1 million, which is slightly greater than the fiscal year 1983 Appropriation. A breakdown of this increase by subprogram follows.

Building systems.—The DOE request of $6.6 million contained no funds for ventilation, infiltration or indoor air quality research and only $1 million for whole building performance related research.

In addition, the Committee held a workshop on Building Energy Research on January 12–14, 1983, at which a number of research items were identified as critical or important which were not included in the DOE request. To compensate for these omissions and to create a balanced long-term R&D program in building systems, the Committee added $9.9 million to this activity, including $0.5 million in capital equipment. The Committee's building systems subprogram consists of the materials and components R&D; whole building performance R&D; and research utilization activities.

Materials and components R&D—$7 million (Envelope systems, $1.5 million; windows and daylighting, $1.2 million; infiltration, ventilation and indoor air quality, $2.0 million; building materials, $1.5 million; and controls, $0.8 million).

Whole building performance R&D—$7.5 million. Performance prediction, $3 million (performance calculations and diagnostics, design tool development, and home energy rating systems); performance monitoring, $2.5 million (includes building energy data, pilot projects and case studies, monitoring to support guidelines); retrofit strategies, $1.0 million (includes development of audit techniques); and systems analysis for multifamily and commercial buildings, $1.0 million).

Research utilization—$2 million. Education and technical assistance, $1 million; and research on institutional factors—$1 million.

The Committee recommends that DOE provide sufficient funds to research teams at Lawrence Berkeley Laboratory and the National Bureau of Standards to maintain their fiscal year 1983 research activities and staffing levels.

Community systems.—DOE requested no funds for this subprogram. The Committee added $2 million for the urban consortium project, and $1.5 million for research and technical assistance to communities on district heating and other community-scale energy systems. The Committee recommends that Argonne National Laboratory continue to be recognized as the DOE's lead technical laboratory in the community energy systems area. The Argonne Laboratory has initiated many successful programs in community energy science and has been the focal point for planning, developing, and applying community energy systems nationwide. The Committee recommends further that the Department make available such funds as necessary to maintain adequate manpower levels at the Argonne Laboratory in order to carry out these programs in accordance with the provisions of this Act.

Urban waste.—DOE requested no separate funding for urban waste R&D, but included about $800,000 in its request for the biomass program. The Committee added $2 million for R&D activities directed at urban wastes to be carried out in conjunction with the biomass program. These activities should include basic and applied research on biochemical and thermochemical processes and on separation techniques. Conversion-related research should include process characterization, laboratory analysis testing, and design and construction of process development units.

Building equipment.—(formerly known as Technology and Consumer Products). The DOE request of $5.25 million would have reduced the four main activity areas of this subprogram—lighting, heat pumps, refrigeration systems and combustion equipment—to about half of their fiscal year 1983 levels. The Committee added $5.3 million to restore the subprogram to the $10.6 million level, as follows:

Combustion heating equipment—$2.5 million (includes gas and oil, $0.9 million; heat distribution, $0.9 million; and wood and coal, $0.7 million).

Thermally activated heat pumps—$3.3 million (includes heat engine driven heat pumps, $1.8 million; and absorption heat pumps, $1.5 million).

Refrigeration systems and appliance technology—$2.8 million (includes heat exchangers, $1.0 million. Rankine systems research, $1.65 million; appliance technology, $0.25 million).

Lighting systems—$2 million (includes lamp technology, $1.3 million; and system integration and performance, $0.7 million).

The Committee recommends that DOE provide sufficient funds to research teams at Oak Ridge National Laboratory, Brookhaven National Laboratory, and Lawrence Berkeley Laboratory to maintain their fiscal year 1983 research activities and staffing levels.

Program direction.—The Committee added $0.865 million to restore this function to its fiscal year 1983 level ($2.5 million). This will enable the BCS program to maintain its fiscal year 1983 staffing level, which is estimated at 55 FTE's.

INDUSTRIAL ENERGY CONSERVATION

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Waste energy reduction	$12,000	$7,300	$4,700	$12,000
Process efficiency	7,700	2,400	+5,300	7,700
Cogeneration	5,000	0	+5,000	5,000
Program direction	1,500	733	+767	1,500
Subtotal	26,200	10,433	+15,767	26,200
Capital equipment	0	0	0	0
Total program	26,200	10,433	+15,767	26,200

The Industrial Energy Conservation program carries out long-term, high risk research and development aimed at improving the efficiency of industrial and agricultural processes and substituting abundant for scarce resources in those sectors. The program consists of three subprograms:

Waste energy reduction.—Development of technologies to recover or recuperate waste heat and materials from industrial processes for use as energy sources.

Industrial process efficiency.—Applied research and development aimed at improving the energy efficiency of equipment used in those most energy-intensive industries which do not carry out a great deal of their own research.

Industrial cogeneration.—Research and development of advanced technologies to generate electric power and thermal energy at industrial sites with a high electricity to steam ratio.

COMMITTEE ACTION

The Committee increased the industrial conservation program by $15.767 million to a level of $26.2 million, which is slightly above the fiscal year 1983 appropriation. Details of the increase are as follows:

Waste energy reduction.—The Committee added $4.7 million to restore this subprogram to its fiscal year 1983 level of $12.0 million. Activities to be carried out include improved combustion efficiency, $1.8 million; advanced high temperatures recuperators, $1.0 million; advanced high temperature industrial heat pumps, $2.2 million; recovery of fuels from liquid wastes, $0.8 million; conversion and utilization of solid wastes $2.6 million; utilization of recycled materials, $0.9 million; and field laboratory support, $2.7 million.

Industrial process efficiency.—The Committee added $5.3 million to restore this subprogram to its FY 1983 level of $7.7 million. Activities to be carried out include catalyst research, coatings research, freeze crystallization, membrane separation research, black liquor characterization, advanced sensors and computer controls, advanced electrode R&D, advanced grinding and classification systems, and high temperature materials processing.

Industrial cogeneration.—The Administration's request for no funds for this subprogram disregards recommendations by the Office of Technology Assessment and the DOE Energy Research Advisory Board that DOE carry out research and development aimed at advanced cogeneration systems with high electricity-to-steam output ratios. Therefore, the Committee added $5.0 million to restore the subprogram to its fiscal year 1983 level, in order to carry out the following activities:

Design, construction and operation of a coal-fired Brayton cycle system—$2.0 million.

Engine testing and advanced design for a coal water slurry diesel system—$2.0 million.

Laboratory and field testing and advanced design of a thermionic burner system—$1.0 million.

Program direction.—The Committee added $0.767 million to the DOE request of $0.733 million to restore funding and staffing to their fiscal year 1983 levels ($1.5 million; 33 FTE's).

VEHICLE AND ENGINE R&D

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Vehicle propulsion R, D&D	$35,000	$16,100	+$26,000	$42,100
Electric/hybrid vehicle R, D&D	13,900	9,500	0	9,500
Alternate fuels utilization	1,500	4,000	0	4,000
Advanced materials development	2,000	1,500	0	1,500
Program direction	1,500	357	+1,143	1,500
Subtotal	53,900	31,457	+27,143	58,600
Capital equipment	0	0	0	0
Construction: Advanced materials development	0	9,000	0	9,000
Total program	53,900	40,457	+27,143	67,600

The objective of the Vehicle and Engine R&D program is to perform research and development on vehicles and engines which will increase the fuel efficiency of the transportation system and allow a switch from petroleum to electricity and alternative fuels. The strategy to achieve this objective includes emphasis on technology development rather than product design, maximum involvement by U.S. industry in identification and solution of technology problems, and concentration on key technology barriers where high risks prohibit industry-only financing.

Vehicle propulsion R&D.—The advanced Automotive Gas Turbine (AGT) engine program has been supported under the Vehicle Propulsion R&D program since fiscal year 1980 and has been implemented through two industry teams. The major technological barriers identified early in the program were in the areas of small component aerodynamic efficiencies and in the application of ceramic materials to high temperature structural components. In fiscal year 1984 the proof-of-concept automotive gas turbine program will continue with two contractors focussing efforts on the development and evaluation of ceramic stationary and rotating components and the improvement of component aerodynamic performance. Engine and hot components and the improvement of component aerodynamic performance. Engine and hot rig tests will be performed with first generation ceramic turbine rotors and improved ceramic static components. Continuing development will be performed on structural ceramic high-temperature, long-life, low-cost components with emphasis on fabrication techniques, materials processing, and materials property investigations. Technology assessments of highway transportation related industry, academic and government R&D efforts will continue, as will efforts to effect program coordination with other government agencies and technology transfer with industry. The proof-of-concept automotive Stirling engine program will continue with preliminary design of the Mod II engine.

In 1980, heavy trucks (26,000 lbs. gross vehicle weight) were used about 90 percent of all highway diesel fuel. Between 1975 and 1980, heavy truck energy use increased from 14 percent to 17 percent of total highway energy use, and is expected to reach 20 percent by 1990. Initial evaluations of the benefits of uncooled, reduced friction, commercial heavy duty diesel engines with waste heat recovery indicate the potential for up to 90 percent gain in operational fuel economy. In fiscal year 1984, the process of analysis to screen out the more promising approaches to high-temperature ceramic insulating materials, high-temperature tribology (friction, wear and lubrication), and toughened ceramics will be continued. The high-temperature tribology efforts will complement the characterization of the lubricity of base stock oils molecular fractions being conducted as part of the Energy Conversion and Utilization Technologies (ECUT) program. Initial comparisons will be made of techniques for waste heat recovery in light of appreciably higher exhaust temperatures. Systems modeling techniques will be developed to evaluate the potential of uncooled diesel engine technology coupled with appropriate waste heat concepts.

Engine and hybrid vehicle R&D.—The objective of this effort is to conduct the research and development of the long-term, high-risk technologies that would assist industry in producing electric vehicles. One of the most important technologies to be developed is batteries specifically for electric vehicle application. The desirable attributes of an electric vehicle battery include: high power density for vehicle acceleration and hill climbing, increased energy density for greater range and improved cycle life for repeated deep discharging and recharging. In fiscal year 1984 research on lead-acid battery technology will continue on the most promising concepts for reducing capacity loss and extending battery life. An advanced experimental nickel-iron, full-vehicle-size battery pack will be developed, including gas and electrolyte management systems previously developed at the module level. Research and development on advanced batteries (i.e., zinc-bromide and sodium-sulfur) will be continued towards technology compatible with a.c. propulsion systems for passenger car and van applications.

In the vehicle test site operations, vehicle technology deficiencies are being identified and characterized leading to research and development programs to resolve these deficiencies. In fiscal year 1984 test and evaluation activities of new technology will include a thermally-controlled battery compartment to improve battery performance (by 20 to 25 percent) and extend battery life; a microprocessor battery monitoring system and battery watering systems; and new technology lead-acid, nickel-iron and zinc-chlorine batteries. The road and track testing of experimental vehicles will continue to identify and characterize technology deficiencies in an operational environment. The User Task Force of electric vehicle site operations will continue to be supported for resolving operational problem areas and proof-of-concept testing of new technologies.

Alternative fuels utilization.—The Alternative Fuels Utilization program has the objective of achieving technical commercial readiness of various finished-fuel/engine combinations appropriate to extending and eventually replacing petroleum as fuel for mobile equipment, with emphasis on highway vehicles. In fiscal year 1984, the exploratory investigation of fuels from synthetic crudes will continue with more meaningful results achieved due to availability of representative test fuels from synthetic crude. Data from use of selected reference samples in both government and industry sponsored tests will be pooled to provide an expansive data reservoir. Test and evaluation of safety and operational related problems which remain as barriers to use of methane and other gaseous fuels will be conducted. Selected tests and evaluation will be conducted to delineate the optimum results which can be achieved in contemporary equipment by use of essentially straight methanol fuel in liquid, reformed and/or dissociated form.

Advanced materials development.—The need for independent research on advanced materials has become evident as work progresses on the gas turbine and uncooled heavy duty diesel projects. Most advanced engine component designs require materials which can operate at higher temperatures and under more severe cyclic stress and corrosive environments than conventional engines. Although the engine programs are providing the required focus to prove the potential of ceramic components, a parallel basic technology effort is necessary for the development of reliable and reproducible ceramic parts. Current activities are directed towards research and development of monolithic and composite ceramic materials and in joining of ceramic to ceramic and ceramic to metal.

Non-destructive evaluation techniques and improved processing techniques are being developed. In fiscal year 1984 research will contunue on monolithic and composite materials processing, focussed on obtaining fully-dense, near-zero-porosity materials in near-net shapes. Research on materials evaluation techniques will focus on time-temperature behavior, micro-structure analysis, nondestructive evaluation of physical and mechanical properties, and thermal fatigue screening. The first phase of the construction of an advanced materials laboratory to support advanced materials development programs and activities will be initiated.

Program direction.—The budget request provides for 28 to 30 FTEs to develop the overall strategies, plans and resource requirements, and provide the integrated program management necessary to conduct the research and development of the various transportation technologies described in the budget request.

COMMITTEE VIEWS

Nitinol heat engines.—The Committee believes that nitinol heat engines have the potential to convert waste heat and solar energy to useful mechanical energy with improved energy efficiency. The Committee directs the Assistant Secretary for Conservation and Renewable Energy to conduct a study of the feasibility of initiating a research and development program on nitinol heat engines. Such study shall include, but not be limited to, an examination of the potential operating efficiencies of the engine, the likely market and market penetration, the cost of developing such an engine and the principle scientific and technological problems that must be overcome to develop a cost-effective engine.

HTML.—The Committee strongly supports the expeditious construction of the High Temperature Materials Laboratory (HTML) at Oak Ridge National Laboratory (ORNL). In the accompanying authorization for fiscal year 1984, HTML appears as Project No. 84–CS–101, a new construction line item under Energy Conservation.

DOE first requested construction funding for HTML at ORNL under the Basic Energy Sciences program (Project 82–E–322) in the fiscal year 1982 budget. Title X of Public Law 97–35 authorized $3.5 million for HTML construction in fiscal year 1982, however, no funds were appropriated for the project in fiscal year 1982 and fiscal year 1983. (It should be noted that the Senate-passed Energy and Water Development Appropriations for fiscal year 1982 and fiscal year 1983 both contained HTML construction funding.)

In the fiscal year 1984 budget request DOE has proposed HTML as a construction line item under the Vehicle and Engine R&D activity of the Engine Conservation program. This programmatic and budget line shift is justified by the fact that the HTML research program may have major impacts on improved materials for energy efficient transportation technologies.

The Committee is aware of an Administration proposal to initiate construction in fiscal year 1983 using unobligated carry-over funding in the Energy Supply R&D appropriation account. The Committee supports this latest Administration proposal for accelerating HTML construction.

Assuming approval by the House and Senate Appropriations Committees of any fiscal year 1983 HTML funding, the Committee urges DOE to move ahead with the project and to provide subsequent program continuity in either the Basic Energy Sciences or Energy Conservation areas.

COMMITTEE ACTIONS

The Department of Energy requested $40.457 million for Vehicle and Engine R&D in fiscal year 1984. This amount is 25 percent less than the amount appropriated for fiscal year 1983. This request includes $9 million to start construction of a High Temperature Materials Laboratory at Oak Ridge. Discounting the contribution of this project, the budget request to complete projects is actually 42 percent less than the 1983 appropriation.

The Committee understands that the gas turbine program plan has always called for convergence to one contractor in fiscal year 1983. Nevertheless, because of the extremely high level of interest by industry in the ceramics work that is at the core of this project and the different technical approaches being taken, the Committee believes both contractors should be continued through completion of MOD II. The Committee therefore recommends an additional $12 million for this purpose.

Despite Congressional intention to continue the Stirling engine proof-of-concept demonstration, as indicated both in recent authorizations and appropriations, the DOE has again proposed termination of the project. The Committee believes this action is shortsighted. Accordingly, it recommends $14 million for continuation of the Stirling project toward development and characterization of MOD II. The Committee also urges DOE to pursue actively the transfer of Stirling technology to U.S. industry.

The Committee further recommends an increase of $1.143 million to the Program Direction line to provide for DOE civil service staffing requirements at approximately the fiscal year 1983 level (23 to 30 positions). The total authorization is $67.6 million.

MULTISECTOR

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Inventors program	$2,000	0	+$4,000	$4,000
Energy conversion technology	9,000	$3,000	+5,750	8,750
Progran direction	230	102	+128	230
Subtotal	11,230	3,102	+9,878	12,980
Capital equipment	0	0	+250	250
Total program	11,230	3,102	+10,128	13,230

The Conservation Multi-Sector category is comprised of two separate programs: Energy Related Inventions and Energy Conversion Technology.

Energy related inventions program (ERIP).—ERIP provides direct support to inventors by evaluating their inventions, providing technical assistance, and supporting the development and demonstration of those products that receive a favorable evaluation. The National Bureau of Standards carries out the evaluations and DOE negotiates support contracts with successful inventors. As of July 31, 1982, 18,296 evaluation requests had been received by NBS; 9,100 had been accepted for evaluation; 219 had been recommended to DOE for support and 165 support awards had been negotiated.

Energy conversion technology.—This program supports basic and applied research on advanced concepts for improved energy efficiency in areas such as combustion, thermal sciences, materials and tribology. The program was initiated in fiscal year 1980 with an expectation that it would grow to an ultimate funding level of $25 to $50 million/year.

COMMITTEE ACTION

The Committee added $10.128 million to the Conservation Multi-Sector category. Details of the Committee initiative are as follows:

Energy related inventions.—Add $4 million to continue operation of the program, with $1.5 million to be provided to NBS for evaluation and $2.5 million to DOE for support to inventors. The program was very favorably evaluated by the Oak Ridge National Laboratory and continues to receive more than 2,000 evaluation requests a year. ERIP does not appear to be in any way duplicative of the Small Business Innovation Research program operated out of the DOE Office of Energy Research. $4 million appears to be the minimum level needed to support both NBS and DOE activities at viable levels.

Energy conversion technologies.—The Committee added $6 million (including $0.25 million in capital equipment) to the DOE request of $3 million to continue this program at its fiscal year 1983 level. Research will be supported in engine combustion ($3.5 million); stationary combustion ($0.5 million); thermal science ($0.5 million); high temperature materials ($2 million); high strength light weight materials ($1 million); and tribology ($1.5 million).

C. ENERGY SUPPLY R&D

1. SOLAR ENERGY

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Photovoltaic energy systems	$58,035	$32,700	+$24,500	$57,200
Solar thermal energy systems	49,100	13,325	+37,675	51,000
Solar building energy research	11,650	8,375	+14,125	22,500
Wind energy systems	31,400	8,600	+13,400	22,000
Biomass energy technology	16,000	17,300	+12,000	29,300
Alcohol fuels R&D	5,000			
Ocean energy systems	10,500	0	+7,500	7,500
Program direction	5,850	3,009	+2,841	5,850
Solar program support	1,000	0	+1,000	1,000
Solar reserve account	1,000	0	+0	0
Solar Energy Research Institute	0	0	+1,000	1,000
Subtotal	188,535	83,309	+114,041	197,350
Capital equipment	400	250	−250	0
Construction	0	0	+1,500	1,500
Total program	188,935	83,559	+115,291	198,850

The DOE Solar Energy Research and Development program carries out basic and applied research and exploratory and technology development aimed at reducing the cost, improving the performance and expanding the technology and knowledge base of solar energy system.

PHOTOVOLTAIC ENERGY SYSTEMS

Photovoltaic devices use thin fims or wafers of semiconducting material to convert sunlight into electricity directly with no moving parts. The principal objective of research and development in photovoltaics is to reduce the cost or improve the performance of photovoltaic systems which currently sell for about $10 per peak watt (50–60¢/KWH).

The DOE photovoltaics program has traditionally been organized around four activities.

Advanced research and development.—Investigation and characterization of new and innovative, high performance, low cost materials and concepts.

Technology development.—Development of new technologies and processes for converting photovoltaic materials into cells and modules at substantially lower costs. Testing of modules for reliability and durability.

Systems engineering and standards.—Determining the system requirements for cost-effective photovoltaics technology. Carrying out needed research and development on arrays and balance of systems.

Tests and applications.—Field tests of user oriented systems to determine actual performance characteristics.

The DOE FY 1984 request of $32.7 million included $25.2 million for advanced research and development ($20.5 million in materials research and $4.7 million in cell theory and validation studies); $6 million in technology development, largely for analysis, testing and reliability studies; and $1.5 million for test and applications. (The above figures are a staff reconstruction of the DOE budget request based on information provided by the photovoltaics program.)

COMMITTEE VIEWS

In the area of advanced high efficiency photovoltaic concepts, the Committee feels that more emphasis should be placed on research and development of gallium arsenide materials. This research should be expanded with the goal of developing gallium arsenide thin films that demonstrate both higher cell efficiency and the potential for large volume low cost production.

COMMITTEE ACTIONS

The Committee added $26 million to the DOE request of $32.7 million to restore needed technology development and systems testing activities. The largest share was an addition of $16 million to the technology development subprogram (total budget of $22 million) to continue module analysis and testing and reliability studies ($7 million); R&D on concentrating collectors ($6 million); advanced silicon sheet R&D ($6 million); and silicon materials ($3 million). $4.8 million was added to tests and applications to operate existing test facilities, demonstration projects and the three photovoltaics residential experiment stations. $3.4 million was added to the systems engineering and standards subprogram to continue array and balance of systems work. $2 million was added for planning and assessment. Finally, the SMUD project was authorized at $1.5 million as a separate construction line item, to indicate the Committee's support for funding of the next five megawatt increment (Phase III) over the next few years. This 5 MW Phase III construction project is to have a total estimated DOE cost of no more than $20 million with at least an equal amount to be contributed by the Sacramento Municipal Utility District. It is to be the last DOE funded portion of the total 100 MW project proposed by SMUD. $1.5 million in fiscal year 1984 funding is for design of standardized equipment for bidding by potential contractors.

DOE is directed to apply some of its advanced research and development funds in photovoltaics to chemical engineering analysis of advanced material cell production processes. DOE is also directed to maintain existing teams at the Jet Propulsion Laboratory and Sandia National Laboratories to carry out technology development systems engineering and test and applications activities.

SOLAR THERMAL ENERGY SYSTEMS

Solar Thermal Energy Systems (STES) use mirrors or other concentrating devices to convert sunlight to high temperature heat which then drives a turbine or a mechanical or thermal industrial process. The STES program is organized around the development and testing of three principal STE system types.

The central receiver.—A field of sun-tracking mirrors (called heliostats) focuses sunlight on a receiver at the top of a tower.

The parabolic dish.—A large mirror in the shape of a paraboloid of revolution concentrates sunlight on a receiver or receiver-engine combination at its focus.

The solar pond.—A large body of water in which a salt gradient or transparent cover prevents heat from escaping and thereby allows temperatures close to 100° C to be achieved.

The program also carries out generic long-term, high risk advanced research and exploratory development on components, materials and the production of fuels and chemicals.

In its fiscal year 1984 budget request DOE combined elements of the STES program with research activities from the former active and passive solar programs into a new category called "Solar Heat Technologies," with a total budget of $21.95 million.

That budget consisted of "material research," $11.75 million; "central receiver techology," $7.2 million; and "heat transfer systems analysis," $3 million.

The Committee believes that those program elements which are concerned with the use of solar energy in buildings should be treated separately from those which pertain to industrial and electrical solar thermal applications. Accordingly, the Committee has retained the former budget category of Solar Thermal Energy Systems, and created a new one entitled, Solar Building Energy Research (see below). The elements of the DOE fiscal year 1984 budget request which pertain to the STES program are as follows:

	Millions
Central receiver technology	$7.2
High temperature materials research	4.0
Polymer concentrator materials research	0.5
Collector materials	1.225
Heat transfer materials and fluids	0.35
Planning and assessment	0.3
Total	13.575

COMMITTEE ACTIONS

The Committee added $37.425 million to restore the program to slightly above its fiscal year 1983 level. The largest share of the increase went to the parabolic dish technology development and system testing subprogram which has received strong support from the DOE Energy Research Advisory Board. The Committee budget provides $16 million to complete first generation Brayton module development ($4 million); initiate second generation Stirling module activities ($3.5 million); carry out R&D on advanced concentrators ($2.5 million) and other components and subsystems ($2 million); operate the parabolic dish test facility at Edwards Air Force Base ($1 million); and conduct a multi-module test of a Brayton cycle system ($3 million). In central receivers the Committee increased the Administration's request from $7.2 million to $21 million to fund one detailed design of a solar thermal repowering plant ($7.5 million); continue component development of advanced receivers, steam generators, storage and automated control systems for Solar 1 ($7.5 million); and to operate and collect data from Solar 1 ($4.5 million) and the Central Receiver Test Facility ($1.5 million). The Committee also provided $8 million for advanced R&D on sun fuels, solar ponds, high temperature materials and university support ($2 million each). The Committee provided $4 million for advanced collector and collector materials research and $2 million for planning and assessment.

SOLAR BUILDING ENERGY RESEARCH

This is a new budget category created by the Committee for the fiscal year 1984 authorization. It combines basic and applied research activities formerly carried out in the active and passive solar programs. It also adds new activities recommended to the Committee at its hearing on Building Energy Research on July 22, 1982 and at the Carmel Valley workshop on Building Energy Research co-sponsored by the Committee, DOE, EPRI, GRI, AIA, NAHB/RF and ASHRAE, January 12–14, 1983. The hearing and workshop identified a large number of promising areas for basic and applied research related to buildings which are contained in the Committee recommendations for Buildings Systems (under conservation) and Solar Building Energy Research.

The DOE request for Solar Building Energy Research for fiscal year 1984 consisted of the following activities contained in the "Solar Heat Technologies" category:

	Millions
Desiccants and thermal storage materials	$2.275
High transmission, high insulation glazing materials	1.1
Aperture materials research	2.0
Thermal performance monitoring	1.4
Daylighting resource assessment and model measurement	1.1
Basic heat transfer research	0.2
Heat transfer materials and fluids	0.3
Total	8.375

COMMITTEE ACTIONS

The Committee added $14.125 million to the DOE request to restore the basic and applied research activities funded in the Solar Building Energy Research program to approximately their fiscal year 1982 levels. The Committee budget for SBER includes $11 million for materials and components R&D and $11.5 million for building and system performance R&D. Component and materials activities include research on apertures and aperture materials ($3 million); desiccant materials ($1.5 million); storage and heat transfer materials ($3 million); absorption and desiccant chillers ($2 million); and component testing ($1.5 million). Building and systems performance R&D includes heat transfer research ($2 million); systems modeling and analysis (directed primarily toward cooling, daylighting and commercial and multifamily building design, $4 million); performance monitoring and evaluation, including operation of 40 stations of the national solar data network ($4.5 million); and research utilization ($1 million).

WIND ENERGY SYSTEMS

Since 1973 the United States Government has sponsored research and development in wind energy, aimed at making wind turbines a viable technological alternative to existing electric generating capacity.

A large wind turbine subprogram has developed a series of machines of increasing size and cost-effectiveness, the MOD-OA (200 KW), the MOD-1 (1 MW), and the MOD-2 (2.5 MW). This subprogram will terminate with the MOD-5A and MOD 5B machines in the 7 MW range being built by Boeing and General Electric.

In the small wind area, the government has supported the development of a series of wind turbines from 1-40 KW in size. In addition, the government has operated a test facility for small wind machines at Rocky Flats, Colorado.

The DOE program has also been active in developing and testing vertical axis (Darrieus) wind machines and carrying out wind characteristics and resource assessments.

The DOE fiscal year 1984 request for the Wind Energy Systems program was $8.6 million, including aerodynamic and structural research related to vertical axis and horizontal axis machines ($7.1 million); and operation of the Rocky Flats small machine test center ($1.5 million). No funds were requested for completion of the MOD-5 large wind machines.

COMMITTEE VIEWS

The Committee notes that the large wind program experienced a number of problems in 1982—including cracks in the load-bearing shaft of the MOD-2—which led to more caution by government and contractor engineers in the MOD-5 design. As a result, more component testing, design contingency and design verification are being recommended for the MOD-5 program. The Committee concurs in this recommendation.

The Committee notes that the administration has not made clear its plans for completing the MOD-2 program and disposing of the MOD-2 facility at Goodnoe Hills. The Committee intends for DOE to complete the MOD-2 program in an orderly and expeditious manner while maximizing the information obtained from this significant government investment. Since operation of the MOD-2 machines is critical to achieving the goals of the large wind program, DOE should return these machines to operation as soon as possible.

The Committee is concerned that the MOD-5 program produce a machine that is truly competitive on a cost of energy (COE) basis with conventional electric energy systems, as has been the objective of this program since its inception. Private sector contractors have expressed a willingness to increase their cost-sharing on the MOD-5, with GE currently proposing a 2:1 ratio of private to government funding. Therefore the federal contribution can be limited to design and component testing, with hardware fabrication and installation being carried out by the private sector.

COMMITTEE ACTIONS

The Committee added $13.4 million to the Administration's request, for a total of $22 million, including $12 million which was added to continue design work with both contractors on the MOD-5 machines. The Committee added $1.7 million for research and technology development bringing that subprogram to a total of $10 million. This includes $3 million for horizontal axis machine structural research, $1 million for vertical axis machine structural research, $2 million for horizontal axis aerodynamic research, $1 million for vertical axis aerodynamic research, $0.5 million for atmospheric fluid dynamics research, and $1.5 million for the transfer and operation of the small machine test center.

The Committee incorporated wind characteristics activities into the research and technology development category in order to insure that all work in this area is directly applicable to machine design issues.

No funds are authorized for preparation of the next Wind Systems Comprehensive Program Management Plan required by Public Law 96-345. Previous reports have not provided useful information on a timely basis to Congress.

The Committee is concerned that the Department of Energy fully investigate possible innovative wind energy concepts. Several of these concepts show great promise for tapping the potential of U.S. domestic wind energy resources. Therefore, the Committee strongly encourages the Department to move forward with the development of a proof-of-concept system for appropriate alternative wind energy system configurations.

The Committee directs DOE to study the feasibility of transferring the small machine testing activities from Rocky Flats to the Alternative Energy Institute at West Texas University test site. This test site has been used to carry out similar activities for the U.S. Department of Agriculture over the past few years. The Committee believes that the West Texas site has a better wind regime and will be less expensive to operate. DOE is to report to the Committee on the findings of its study by January 1, 1984.

BIOMASS AND ALCOHOL FUELS

Biomass has the potential to be the Nation's leading supplier of renewable energy by the year 2000. The Office of Technology Assessment estimates that 6-17 quads of energy could be supplied by wood, wood wastes, plants, plant residues and animal wastes by the end of the century; the Energy Research Advisory Board places the figure at about 9 quads.

Currently, biomass provides slightly less than 2 quads of energy per year, primarily from direct combustion of wood in the Nation's pulp and paper mills (about 1.4 quads) and in wood stoves for home heating (about 0.5 quads). These two applications alone, however, will not enable biomass to achieve its full cost-effective potential. New technologies to convert biomass feedstocks to liquid and gaseous fuels, and new techniques for growing and harvesting biomass crops be developed to provide sure sources of supply near the end user.

The DOE Biomass program has traditionally been equally divided between two main activity areas:

Feedstock production, research and development.—Including R&D on short-rotation woody crops; new herbaceous crops and species and aquatic species such as kelp and water hyacinthe.

Conversion technology research and development.—Including R&D on new processes for biochemical conversion (anaerobic digestion, fermentation); thermochemical conversion (gasification, direct liquefaction, pyrolysis); and direct production of hydrogen from microbes and enzymes.

In addition, in fiscal year 1983 the Senate Appropriations Committee directed DOE to establish regional biomass programs in the Northeast, Southeast, Midwest and Far West, similar to a program currently being carried out by the Bonneville Power Administration.

The DOE fiscal year 1984 request for Biomass and Alcohol Fuels combines these two programs into one budget category. The Committee concurs with this combination. The DOE request provides $12.1 million for biochemical conversion research; $4.2 million for thermochemical conversion and $1 million for screening studies for microalgae. No funds are requested for woody crops, herbaceous crops or aquatic species. No funds are provided to continue operation of the regional biomass programs.

COMMITTEE ACTIONS

The Committee added $12 million to the Administration's request of $17.3 million to continue feedstock development R&D and regional biomass activities.

The Department of Energy's request of $1 million for crop related research is inconsistent with the recommendations of the DOE Energy Research Advisory Board, the Office of Technology Assessment, the Biomass Energy Research Association and DOE's own program documents. All of the above recommend a strong federal program in resource assessment, crop production, genetic screening and harvesting techniques. Therefore the Committee included in its fiscal year 1984 authorization funds for short rotation woody crop R&D ($4 million); herbaceous crop R&D ($3 million) and aquatic crop research ($2 million).

The Committee also added $5 million to continue regional programs begun in fiscal year 1983 in the Northeast, Southeast, Midwest and Far West, and to add a program in the Southwest. These regional programs would carry out activities related to technology transfer, industry support, resource assessment, harvesting techniques, and matching local resources to conversion technologies.

In the conversion area, the Committee believes the DOE request places too much emphasis on biochemical conversion as compared to thermochemical conversion and too much emphasis on long term research as compared to technology development. Therefore, the Committee proposes to cut $3.5 million from laboratory scale research on microbial strains and enzyme systems and add $2.5 million to thermochemical conversion technology development for the operation of process research units at the Institute for Gas Technology, Pacific Northwest Laboratory, Battelle Memorial Institute and the University of Missouri at Rolla. The Committee conversion technology research and devlopment budget would therefore contain the following activities:

Biochemical conversion.—$8.6 million, including hydrogen biochemical conversion ($1 million); characterization of bacterial chromosomes ($1 million); lignocellulosic materials research ($1 million); selection and improvement of microbial strains ($2.1 million); applied research on microbial strains ($1 million); mesophilic and thermophilic enzyme systems ($1.5 million); separation of liquid fuels from water, especially nonthermal processes for alcohol separation ($1 million).

Thermochemical conversion.—$6.7 million, including fundamental research ($1 million); pyrolysis ($1 million); gasification process research ($2 million, including operation of units); indirect heating concepts and innovative designs ($1.5 million); direct liquefaction, ($0.5 million); particulate removal and environmental control ($0.7 million).

OCEAN ENERGY SYSTEMS

The DOE Ocean Energy Systems program has historically had as its primary mission the development and demonstration of at least one closed cycle ocean thermal energy conversion system (OTEC). With the funding of preliminary designs for one or two pilot plants in the fiscal year 1983 budget, the closed-cycle OTEC program appears to have reached a logical termination point. Therefore the Committee concurs with the Administration request for no funds for the closed-cycle OTEC program.

COMMITTEE ACTIONS

The Committee provided $7.5 million to redirect the ocean energy systems program toward the development of an open cycle OTEC system. This system appears to have the potential for lower costs and improved performance over closed cycle systems, due to the elimination of costly and inefficient heat exchangers. The largest share of the fiscal year 1984 authorization ($4.5 million) will be devoted to design and construction of a 1 MW open-cycle system test at a shore-based facility. The purpose of the test will be to provide the design, technology and operating experience needed to thoroughly assess the cost and performance potential of an open cycle system. Additional funds ($2 million) will be provided to the Seacoast Test Facility in Hawaii to install upgraded sea water pipes and pumps. Finally, $1 million will be devoted to conducting research on thermal cycles that can be applied to low-temperature thermal gradient sources such as geothermal and power plant bottoming cycles.

No funds are provided for preparation of the next OPEC Comprehensive Program Management Plan required by Public Law 96-310, since this report has not provided useful information on a timely basis to Congress.

Program direction.—The Committee authorized program direction at the fiscal year 1983 level ($5.85 million) to keep the same number of FTE's on board. This is an increase of $2.841 million over the DOE request of $3.009 million.

Solar program support.—The Committee added $1 million to restore this activity to its fiscal year 1983 level.

Solar Energy Research Institute.—The Committee authorized $1 million to design a permanent laboratory facility at the Solar Energy Research Institute. Staff oversight of SERI operations has revealed a serious inadequacy in the size, layout and degree of user control of the rented laboratory space currently being used by SERI. The Committee therefore authorized the design and construction of a facility to provide laboratory and office space for SERI research teams at a total estimated cost of no more than $25 million. Administrative and library facilities would not be included. The Committee understands that Secretary of Energy Hodel has recently expressed support for a permanent SERI laboratory facility.

Energy R&D tax incentives. The Committee believes that appropriate financial incentives can play a significant role in the development of new and advanced renewable energy technologies and more efficient conversation techniques. Testimony received during the fiscal year 1984 Department of Energy Authorization hearings and recent other hearings clearly indicate that strong tax incentives were needed in order to allow for the orderly development of these technologies. These incentives were also needed in order to provide industry manufacturers with more predictable markets and ensure that new energy techniques enter the marketplace at the appropriate time of commercialization.

The testimony indicates that it is necessary to extend the business renewable energy tax credits beyond the current expiration date. These tax credits are essential in stimulating the development of promising solar technologies such as large scale wind, solar photovoltaics and solar thermal energy systems. The failure to extend these tax credits could impede the timely development of renewable energy industries and result in a loss of valuable energy exports.

Thus, the Secretary shall submit to the Congress, within 6 months of the date of enactment of this Act, a report on the role of research and development and investment tax incentives on the development and utilization of advanced renewable energy and conservation technologies. The Committee also encourages the Department to consult with the appropriate Federal Government agencies on a meaningful energy tax program to stimulate the development of these technologies.

2. GEOTHERMAL ENERGY

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Hydrothermal industrialization	$2,200	0	0	0
Geopressured resources	4,400	0	+$8,000	$8.000
Geothermal technology:				
Hot dry rock	7,500	$5,040	+2,500	7,540
Hydrothermal research	7,208	4,434	+5,900	10,334
Hard rock penetration		2,640	0	2,640
Magma energy		845	0	845
Technology transfer		100	0	100
Program direction	1,250	494	0	494
Subtotal	22,358	13,553	+16,400	29,953
Capital equipment	250	0	0	0
Construction	27,020	0	0	0
Total, program	49,628	13,553	+16,400	29,953

The focus of the program is to provide incentives to the private sector for development and utilization of the abundant U.S. geothermal resources and to remove technical barriers associated with the widespread use of these resources. Applied research and engineering studies have been employed to develop technical knowledge which can be utilized for achieving a domestic geothermal industry. Because of the costly and high risk nature of research and technology development of these resources, the government has made a substantial commitment in prior year funding to continue research and development initiatives of this energy source. The Committee believes that this commitment should continue until these technologies are suitable for use in private commercialization.

The program contains initiatives in hydrothermal industrialization, geopressured resources and geothermal technology development, which includes research in the activities of hot dry rock, hydrothermal, hard rock penetration, magma energy extraction, and technology transfer.

The Administration requested $13.553 million for these activities.

COMMITTEE ACTION

The Committee restored total funding for the program to $29.953 million, which is an increase of $16.400 million over the Administration's request of $13.553 million.

The Committee acted on the following programs:

1. Geopressured resources—increased by $8 million;

2. Hot Dry Rock—increased by $2.5 million;
3. Hydrothermal research—increased by $5.9 million.

The Committee did not recommend additional funding in the hydrothermal industrialization subprogram because the Department will have $64.5 million in previously appropriated funds to continue the 50 MWe demonstration plant in Heber, California.

The Committee added $8 million for the geopressured resources activity; $5 million will be allocated to continue well testing in 3 design test wells in Louisiana and Texas; $3 million will be used for a new design test well in a hydropressure aquifer. This new industry/government initiative will provide information on gas liberation and transport, reservoir and fluids properties and artificial lift requirements to produce gas and brine.

In the hot dry rock activity, the Committee added $2.5 million to be used to complete the Phase II thermal loop at Fenton Hill, N.M., and operate it for an extended period to assess reservoir longevity, operating performance and environmental effects. This additional funding will also fulfill the DOE agreement with Japan and West Germany, each of which is contributing $2.5 million toward development of this technology.

The Committee added $5.9 million in the hydrothermal research activity for the Salton Sea Scientific Drilling Project. The proposal is an "add-on" experiment to a proposed commercial geothermal well. By deepening this well from 12,000 ft. to 18,000 ft., it is expected that this will provide samples from a unique pressure/temperature environment never before investigated. It is anticipated that deep wells will yield much higher power outputs than lesser depth wells because of the expected effect of higher pressures and temperatures on flow rates. The Committee believes that this project shows great promise and is a logical step in hydrothermal research.

3. NUCLEAR FISSION

CONVERTER REACTOR SYSTEMS

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses: High temperature gas-cooled reactor (HTGR)	$33,008	0	+$35,000	$35,000
Light water reactor (LWR) systems:				
LOFT	0	$15,000	−13,000	2,000
LWR safety	5,000	0	+7,000	7,000
LWR fuel burnup	5,000	0	+9,500	9,500
LWR worker dose reduction	0	0	+1,000	1,000
Three Mile Island	24,000	33,000	0	33,000
Advanced reactor systems	3,985	0	0	0
Program direction	359	1,190	0	1,190
Subtotal, operating	71,352	49,190	+39,500	88,690
Capital equipment:				
High temperature gas-cooled reactor (HTGR)	2,280	0	+2,000	2,000
Light water reactor (LWR) systems	0	0	0	0
Three Mile Island	5,000	4,000	0	4,000
Advanced reactor systems	200	0	0	0
Subtotal, capital equipment	7,480	4,000	+2,000	6,000
Total	78,832	53,190	+41,500	94,690

High Temperature Gas-Cooled Reactor (HTGR): +$37 million

The HTGR program is for research, development and design of a Lead Plant Project which will become the standard design for future 2240 MW(t) steam cycle/cogeneration plants. This type of powerplant will furnish both electricity and process steam for industry. It will operate at higher temperatures with a resulting increase in plant efficiency and a decrease in cooling water requirements. Furthermore, because it uses an inert gas for cooling and has materials which can withstand higher temperatures than light water reactors, it will be more docile and forgiving should off-normal conditions arise.

Because of its unique features, the HTGR offers a range of opportunities for directly producing process heat for industrial use. For this purpose, an associate effort is underway for systems engineering of a 250 MW(t) modular reactor. The U.S. has a cooperative effort with the Federal Republic of Germany on this concept.

The DOE submitted a budget request for $40 million (including fuel cycle activities) to OMB which was zeroed. During the authorization hearings held by the Subcommittee, DOE supported the OMB position based on the current lack of a powerplant market. However, it should be noted that this absence of orders applies not only to all types of reactors, but also to coal-fired powerplants.

The Committee has supported the HTGR program for five years and the concept is receiving broad support as a safer, more versatile reactor. Proponents of the HTGR concept include a TVA Commissioner and Japanese leaders who are showing an intense interest in the development program.

COMMITTEE ACTION

The sum of $37 million (including $2 million for capital equipment) is recommended for fiscal year 1984 in Converter Reactor Systems to be used for preliminary design, fuel development activities, development of critical components and pursuing "long lead" licensing activities. The Committee also supports a related effort on the modular 250 MW(t) process heat development. (An additional $3 milion is included in Fuel Cycle R&D for thorium fuel development; thus, the Committee recommends a total of $40 million for HTGR activities.)

COMMITTEE VIEW

The Committee continues to support the High Temperature Gas Reactor (HTGR) program and in particular, the 2240 MW(t) Lead Plant Project as a standard design for a cogeneration plant capable of producing both process steam and electricity. The Committee also supports a related effort on the modular 250 MW(t) process heat reactor development.

The Committee notes that the authorization is less than what it might otherwise be in better economic times. Consequently, the Committee urges the Department of Energy to concentrate their resources and those of their contractors on developing the Nuclear Steam Supply System (NSSS) to the extent possible.

In authorizing $37 million, and an additonal $3 million for fuel cycle activities, the Committee notes that the requirement for the utilities and industry to obtain a "letter of intent" from a purchaser for the HTGR has served as useful purpose in consolidating the R&D work. On the other hand, since there is no commercial reactor market, this requirement is no longer valid. Therefore, in authorizing funds for fiscal year 1984, the Committee recommends that certain specific work which directly relates to reactor licensing, and component development and testing be performed as outlined below:

1. Initiate preliminary design and licensing phase;
2. Continue to work with the NRC to clarify criteria for HTGR standard design licensing. Develop safety provisions to accommodate the type of accidents that could be possible in an HTGR;
3. Complete full-scale core support performance testing in the high temperature helium test loop;
4. Initiate full-scale prototype hot duct testing in the high temperature helium test loop at CEA (France);

5. Initiate full-scale partial section performance testing on the core auxiliary cooling system heat exchanger under normal and accident conditions;

6. Complete full-scale main circulator bearing and seal tests;

7. Complete design of facility for full-scale main circulator test;

8. Select reference and alternate materials for advanced concepts;

9. Determine qualification of low-enriched fuel with minimal fission product release and the determination of appropriate source terms for safety evaluations;

10. Perform testing of graphite for fuel elements and support structures, and fuel element configurations to assure adequate structural stability and heat transfer capability during irradiation lifetimes;

11. Perform testing of the prototypical helium circulator to assure minimum potential for moisture ingress into the reactor during all operating conditions and perform investigations of ways to desensitize the reactor and mitigate the consequences of water ingress;

12. Perform testing of those new systems which have been added to the plant to attain the high degree of performance and safety identified for the HTGR; and

13. Perform testing aimed at attaining a high reliability of those components which may be difficult to replace in the integrated system.

By February 1, 1984, the DOE should provide a report to the House Committee on Science and Technology and the Senate Committee on Energy and Natural Resources containing the major milestones and associated funding requirements for the program/ consistent with developing the Nuclear Steam Supply System (NSSS) ready for licensing at the earliest practical date.

In addition, by December 15, 1984, the DOE should submit a summary report to the House Committee on Science and Technology and Senate Committee on Energy and Natural Resources including a specific discussion of each of the items mentioned in the Committee report, outlining the progress and achievements made in fiscal year 1984.

Light Water Reactor (LWR) Systems: Net increase of $4.5 million

The LWR Systems program has historically focused on developing safety technology; developing and demonstrating technology which can be used by utilities to improve the utilization of uranium in LWRs; and reducing occupational radiation exposures while improving nuclear plant productivity.

The fiscal year 1984 DOE budget request for LWR Systems proposes the phasing out or termination of the present safety, extended burn-up and radiation dose reduction activities and the initiation of a DOE/international testing program at the Loss of Fluid Test (LOFT) facility which was previously operated by the Nuclear Regulatory Commission.

COMMITTEE ACTION

LOFT: −$13 million

The Committee recommendation is to delete all funding for the initiation of a testing program at the Loss of Fluid Test Facility (LOFT). The Department will be funded at $2 million to continue discussions with the potential foreign participants and to prepare a study for the Committee justifying a continued program of testing at the LOFT facility.

The Nuclear Regulatory Commission had operated this facility in prior years and was about to terminate its operation and decommission the reactor. The principal limitation of the reactor, as identified by the NRC, is that it was designed for large loss of coolant accidents. This type of hypothetical accident has been extensively explored by the NRC and continued experimentation in this area was determined to have diminished returns.

LWR Safety: +$7 million

The DOE proposes no substantive research activities for the Light Water Safety program but instead would continue a monitoring or study program funded from their Program Director account. The Nuclear Safety Research, Development and Demonstration Act of 1980, which originated in this Committee, anticipated a much more aggressive program aimed at improving nuclear powerplant safety. This recommendation is consistent with the Department's annual program management plan which delineated a $101 million program over 5 years.

LWR Fuel Burnup: +$9.5 million

The Department has proposed to continue this program with one of the five utility/vendor teams now under contract to the Department. They would do so with carryover funds from previous years.

The Committee believes that this program offers a potentially large benefit to utility ratepayers with a comparatively small investment by the government. This program began in fiscal year 1976 and will require appropriations through fiscal year 1990. The total cost of the program is $118 million, of which $73 million has already been appropriated. When it is complete the ratepayer is expected to receive about $12 billion in benefits. The Committee expects that the Department will enter into a limited number of new contracts to achieve the full $12 billion in program benefits. Since the program is over 62 percent complete and future appropriations requirements are modest, the recommendation is to continue the program with all five participant teams.

LWR Worker Dose Reduction: +$1 million

The Department is proposing to phase out all work in occupational dose reduction, and thus, requests no funding for this activity in fiscal year 1984.

The Committee recommends continuing work on reducing worker exposure levels. Although the average annual exposure level of occupational workers is about one-eighth of the NRC's safety level of 5 rems, more workers are necessary so that the average dose level can remain low. On the other hand, the nuclear

Navy has reversed a similar trend by improving technology and operational and maintenance practices. The Department has confirmed that occupational radiation exposures can be significantly reduced and the Committee believes that the program should be continued to accomplish this goal.

COMMITTEE VIEW

Nuclear Energy R&D

The Committee recognizes that no new powerplants were ordered in the last year and that the demand for energy has declined. But, the Committee also recognizes that industrial production is far below capacity, that the total population is still increasing, that old powerplants will be retired, and that a shift toward greater dependence on electricity is inevitable since real growth in the GNP is closely coupled to the consumption of electric energy. The Committee also notes the achievements of energy conservation and anticipates continuing benefits from conservation in reducing energy demands in the future. Nevertheless, there is every indication that there will be a need for new powerplants in the future. Consequently, the Committee wishes to take advantage of this brief decline in demand for electricity to verify the options for proceeding with research and development activities in the nuclear field. Accordingly, the Committee urges the Department of Energy to undertake a broadly-based investigation through the Energy Engineering Board of the National Research Council. The Committee desires that this investigation include all aspects of the field of nuclear energy, such as advanced powerplants, nuclear fuel cycle requirements, and waste disposal. Hopefully, the results of the investigation will provide the pathways that can be followed in performing nuclear research and development activities in the future so that these activities can be carried out at minimum cost and optimum effectiveness. The results of the investigation would hopefully serve as a technical guide to the Department of Energy and would be based on the best technological approach to future research and development work.

COMMERCIAL WASTE MANAGEMENT

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Terminal isolation generic R&D	$21,600	$4,700	+$3,300	$8,000
Waste systems technology	8,925	9,440	+2,000	11,440
Waste treatment technology	6,603	5,600	0	5,600
Program direction	871	480	0	480
Subtotal, operating	37,999	20,220	+5,300	25,520
Capital equipment	3,070	960	0	960
Construction:				
84-N-105, GPP, Richland, Wash	1,100	1,400	0	1,400
Total	42,169	22,580	+5,300	27,880

The Commercial Waste Management program supports basic generic R&D for technology related to the long-term management and disposal of commercial radioactive waste.

Congress enacted the Nuclear Waste Policy Act which mandates a federal government program to ultimately provide a mined geologic disposal facility in return for utilities agreeing to pay the full cost of these development activities. These non-generic activities, including design, construction and operation of a Test and Evaluation Facility, which were previously funded under the Commercial Waste Management budget, are now included in the Nuclear Waste Fund budget.

COMMITTEE ACTION

Terminal Isolation Generic R&D: +$3.3 million

The increase will permit the Department to fabricate and field test both the heat transfer equipment and the pentrometer equipment that will be designed under the Administration's proposed budget for sub-seabed disposal. The Committee's recommendation would increase the budget to approximately the level appropriated for this activity in Fiscal Year 1983.

Waste System Technology: +$2 million

The Committee supports the proposed demonstrations related to radionuclide migrations and advanced waste volume reduction systems for solid and liquid reactor wastes. This program is designed to assist the states and regions in the management of low-level waste sites to be developed under the Low-Level Radioactive Waste Policy Act.

+$2 million to conduct a demonstration of advanced techniques for thorium removal and decontamination of the W. R. Grace site and vicinity properties in the Wayne/Pequannock, New Jersey area.

NUCLEAR FUEL CYCLE

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Fuel reprocessing R&D	$29,156	$31,385	+$7,000	$38,385
Thorium cycle	2,653	0	+3,000	3,000
Advanced reprocessing research	0	0	+3,500	3,500
Subtotal, fuel reprocessing	31,809	31,385	+13,500	44,885
Spent fuel technology	5,421	4,500	0	4,500
Program direction	853	1,422	0	1,422
Subtotal, operating	38,083	37,307	+13,500	50,807
Capital equipment:				
Fuel reprocessing R&D	3,600	4,000	0	4,000
Spent fuel technology	968	500	0	500
Subtotal, capital equipment	4,568	4,500	0	4,500
Total	42,651	41,807	+13,500	55,307

The Nuclear Fuel Cycle program activities focus on development of the Liquid Metal Fast Breeder Reactor (LMFBR) fuel cycle, storage technologies, and a reprocessing capability for the Light Water Reactor (LWR) fuel cycle.

COMMITTEE ACTION

Fuel Reprocessing R&D: +$13.5 million

Breeder Reprocessing Engineering Test (BRET): +$7 million

The Committee recommends an additional $7 million for advanced fuel reprocessing to support conceptual design and related activities for a small-scale Breeder Reprocessing Engineering Test (BRET) at the Fuels and Materials Evaluation Facility (FMEF) at Richland, Washington.

Fiscal year 1984 funding will be used to complete a conceptual design for BRET; complete fabrication and begin testing of critical process equipment; determine what process equipment will be required and start detailed design of such equipment; and begin the detailed design of necessary modifications to the FMEF.

Thorium Fuel Development: +$3 million

The Committee recommends an additional $3 million to support continuation of the development of the "after reactor" back end of the High Temperature-Gas-Cooled Reactor (HTGR) fuel cycle including reprocessing and waste disposal technology. This recommendation is consistent with the Committee's action to fund the HTGR program in Converter Reactor Systems.

Advanced Reprocessing Research: +$3.5 million

The Committee recommends that a new reprocessing R&D program be initiated by DOE. The Committee believes that a two-year investigation should be initiated to quantify the potential for research and development work in advanced techniques for separation of spent nuclear fuel. The Committee has authorized $3.5 million in fiscal year 1984 for the purpose of funding such work with the Los Alamos National Laboratory in a lead role. The work will be to investigate the possibility of using plasma separation, laser separation, and improved chemical techniques for the purpose of refining spent nuclear fuel to further reduce waste disposal problems, and recover precious metals. In addition, the Committee looks forward to early consideration of unique robotics for safer operations associated with these advanced processes.

The Committee expects that Los Alamos will draw upon existing experience and the resources of the Lawrence Livermore Laboratory, Oak Ridge National Laboratory, Pacific Northwest Laboratory, industry and universities. These preliminary studies would be expected to take two years at a cost of $3.5 million/year.

ADVANCED NUCLEAR SYSTEMS

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Space and special applications	$35,198	$30,135	0	$30,135
Program direction	981	1,370	0	1,370
Subtotal, operating	36,179	31,505	0	31,505
Capital equipment	2,764	2,600	0	2,600
Total	38,943	34,105	0	34,105

The Advanced Nuclear Systems program includes the development and delivery of nuclear power sources for U.S. military and civilian space and terrestrial missions and for the assessment and maintenance of these nuclear energy sources consistent with health and safety requirements. In fiscal year 1984, program activities will include the continuation of the development of the radio isotope power sources on a revised schedule for the NASA Galileo spacecraft planned for launch in 1986 and the NASA/European Space Agency (ESA) International Solar Polar Mission (ISPM) spacecraft also planned for launch in 1986; the continuation of the space nuclear reactor power program in coordination with NASA and DOD; and the continuation of technology activities under the advanced modular isotope thermoelectric generator program (MITG) into a ground demonstration phase.

COMMITTEE ACTION

Space Nuclear Reactor Power Program

The Committee recommends that of the $34,105 million authorized for Advanced Nuclear Systems, up to $250,000 of the funding for the Space Nuclear Reactor Power program is to be used to support planning activities related to implementing the follow-on ground engineering phase, once the conceptual design phase of the program is completed. The Committee recognizes that all follow-on planning activities are to be accomplished within the purview of the SP-100 program management structure to ensure the participation of all signatories to the SP-100 Memorandum of Agreement in such activities.

COMMITTEE VIEW

Space Reactor Technology Development

On February 11, 1983, the Department of Energy entered into an agreement with the National Aeronautics and Space Administration and the Defense Advanced Research Projects Agency to jointly develop the technology necessary for space nuclear reactor power systems. This SP–100 program calls for establishment of "performance limits and military and civil utility for space nuclear power in the 100 kilowatt and multimegawatt (electric power) classes."

The Committee understands that the most probable near-term application of space nuclear reactor technology will have military implications. It is also recognized that the technology base resulting from this cooperative enterprise among the three Agencies will provide the foundation for designing space power subsystems suitable for future, as yet unspecified, civil oriented missions. It is the hope of the Committee that such mission definition analyses proceed in a deliberate and timely manner. The Department is therefore instructed to report to the Committee on planned disbursements of all funds for the Space Nuclear Reactor Technology program (SP–100) including amounts in excess of those specified in the tri-agency agreement.

The Department will also be required to fully support NASA in its efforts to define space reactors suitable for civil as well as defense-oriented missions. The Committee anticipates that such mission studies will serve to delineate the power ranges most suited to non-military uses of space nuclear reactors, and substantiate the appropriate level of authorized Department funding relative to DARPA and NASA for this work.

It is requested that the Department provide a brief summary report on a semi-annual basis to the Committee that details plans, accomplishments and schedules related to its activities in the SP–100 program. In addition, the Department is to inform the Committee on all efforts on-going and planned to delineate agency responsibilities and resources to be applied to a follow-on ground engineering systems development program.

BREEDER REACTOR SYSTEMS

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Liquid metal fast breeder reactor (LMFBR):				
Large-scale prototype breeder	$15,000	$15,000	0	$15,000
Base technology program	248,299	240,600	−$2,000	238,600
Subtotal, LMFBR	263,299	255,600	−2,000	253,600
Water-cooled breeder reactor	44,784	35,500	0	35,500
Program direction	8,061	10,200	0	10,200
Subtotal, operating	316,144	301,300	−2,000	299,300
Capital equipment:				
LMFBR	14,608	19,100	0	19,100
Water-cooled breeder	200	0	0	0
Subtotal, capital equipment	14,808	19,100	0	19,100
Construction:				
84–N–102, modifications to reactors, various locations	0	4,000	0	4,000
84–N–101, general plant project, various locations	0	1,000	0	1,000

BREEDER REACTOR SYSTEMS—Continued

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
83-N-334, safeguards and security assessment improvements, ANL-West, Idaho	$400	$1,000	0	$1,000
78-6-E, Energy Technology Engineering Center, facility modifications, Santa Susana, Calif	5,000	5,000	0	5,000
78-6-C, Safety research experiment facilities, ANL-West, Idaho	9,000	1,100	0	1,100
Prior-year projects	10,600	0	0	0
Subtotal, construction	25,000	12,100	0	12,100
Total	355,952	332,500	−$2,000	330,500

The Breeder Reactor Systems program supports R&D activities to develop the technology for the Liquid Metal Fast Breeder Reactor (LMFBR); to develop plans in cooperation with industry for a large-scale prototype breeder; and to develop technology for improving the efficiency of fuel resource utilization by water cooled nuclear reactors used for electrical power generation.

COMMITTEE ACTION

Clinch River Breeder Reactor Project (CRBRP)

By adopting the amendment pertaining to the Clinch River Breeder Reactor Project the Committee acted to not authorize any funds to continue or terminate the project in H.R. 2587, or pursuant to the provisions of Chapter 1 of Subtitle A of Title X of the Omnibus Reconciliation Act for fiscal year 1984. The Committee did not specifically deauthorize or terminate the project, but acted to clarify the Committee's intent that the project receive no authorization for fiscal year 1984 until subsequent authorization legislation is enacted.

Breeder Base Program; Redirect $2 million and −$2 million general reduction

The Subcommittee recommends a redirection of $2.0 million from within the LMFBR base program for the purpose of rescoping the Fuels and Materials Examination Facility (FMEF) at the Hanford Engineering Development Laboratory.

Water Cooled Breeder Reactor Program: Redirect $1 million

The Water Cooled Breeder program's mission is to develop technology for significantly improving the efficiency of nuclear fuel resource utilization by water cooled nuclear reactors used for electrical power generation. The concept being evaluated is a self-sustaining breeder reactor, cooled and moderated with ordinary (light) water and fueled with uranium-233 and thorium. Among the objectives of this program are the following: prove that breeding can be achieved in a light water nuclear reactor using the uranium-233/

thorium fuel system; confirm a practical way to use thorium; show the feasibility of installing prebreeder and breeder cores of the Light Water Breeder Reactor type in existing and future pressurized water reactor plants using current types of plant components and systems; and make the technology developed under the program available to commercial industry.

A light water breeder core was installed in the Shippingport Atomic Power Station in 1977. On October 1, 1982, the light water breeder core had accumulated more than 26,900 effective full power hours while supplying electric power to the Duquesne Light Company distribution system.

It is anticipated that successful confirmation of breeding in the Shippingport light water breeder core will provide the basic technology which would make available for power production about 50 percent of the energy in the nation's thorium reserves.

An activity closely related to the Water Cooled Breeder Program is the Proof-of-Breeding analytical effort at the Argonne National Laboratory. Sixteen fuel rods will be dissolved and precisely analyzed to determine breeding. The Shippingport Atomic Power Station, operated by the Duquesne Light Company, has terminated operation and will be defueled by the end of 1984. The decommissioning project, which will be carried out by private contractor, will involve dismantlement and removal of the DOE-owned portions of the plant. The decommissioning project cost is estimated to be $74,750,000 and the projected completion date is fiscal year 1988.

COMMITTEE ACTION AND VIEW

Water Cooled Breeder Program—Technology Transfer

The Committee recommends the redirection of $1 million from within the Water Cooled Breeder Program for the purpose of establishing a technology transfer activity that will ensure the direct involvement of the private sector in the analyses and utilization of defueling, decommissioning and core evaluation testing.

Since its inception in December, 1965, Congress has authorized and appropriated about $750 million for the Water Cooled Breeder Reactor Research and Development Program. It is estimated that more than $800 million will be spent before the program is completed around fiscal year 1988. The Committee is concerned that, in view of the fact that the major emphasis in the U.S. Breeder Reactor Development Program is on the Liquid Metal Fast Breeder, the taxpayers will not receive the full benefit from this significant investment in the light water breeder unless the Department establishes a distinct and specifically chartered technology transfer operation to work with the Naval Reactor Program Office and other offices directly engaged in programs related to the Shippingport Station water-cooled breeder operation.

The Committee recognizes the logistic and professional difficulties of establishing such an operation within the Naval Reactor Program Office, whose major functions are highly technical in nature and principally directed towards classified defense related work. Nevertheless, as the principal advocate of this alternative breeder concept, the Naval Reactor Program Office must assume the responsibility for ensuring that the fundamental knowledge, technical innovations, engineering advances and unique operating experience acquired from this enterprise is retained for possible future public use. It is also essential that information about the separately-funded Shippingport decontamination and decommissioning operations, which are to be carried out under the Remedial Actions program, be assimilated, to the maximum extent practicable, by the utilities, and nuclear plant designers, manufacturers, and equipment suppliers who can most benefit from such information.

The Committee thus recommends that the Department allocate up to $1.0 million of fiscal year 1984 WCBR funds for the purpose of retaining a professional firm skilled in the processes of transferring technology from the federal R&D programs to the private sector. Funds should also be used to establish an industry/government task force responsible for overseeing the specific operations required to accomplish such transfer, and for any other purposes deemed necessary to achieve the transfer of light water breeder reactor technology to the private sector. The Department is required to report to the Committee its plans, organizational structure and proposed schedules for implementing this activity on or before October 1, 1983.

4. MAGNETIC FUSION

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Applied plasma physics	$73,300	$76,040	+$2,500	$78,540
Confinement systems	181,000	186,050	+14,500	200,550
Development and technology	74,300	77,310	+6,000	83,310
Planning and projects	28,962	48,700	+10,000	58,700
Program direction	4,000	4,600	0	4,600
Subtotal, operating	361,562	392,700	+33,000	425,700
Capital equipment:				
Applied plasma physics	4,000	5,060	0	5,060
Confinement systems	21,300	20,650	0	20,650
Development and technology	9,700	7,740	0	7,740
Planning and projects	4,000	4,350	0	4,350
Subtotal, capital equipment	39,500	37,800	0	37,800
Construction:				
84–ER–109, general plant projects, various locations	0	6,500	0	6,500
78–3–A, Mirror Fusion Test Facility–B, Lawrence Livermore Lab, Calif	40,000	30,000	0	30,000
Prior-year projects	6,000	0	0	0
Subtotal, construction	46,000	36,500	0	36,500
Total	447,062	467,000	+33,000	500,000

The goal of the Magnetic Fusion program is to develop and ultimately demonstrate the technology for providing electric power from fusion reactors at commercial-scale. This R&D program is unique in the sense that there is already a requirement for reactor engineering development to go forward in parallel with the research directed toward proof-of-principle for fusion, i.e., the achievement of power generation output in excess of input power to the fusion device. The Committee has been concerned about sustaining industry involvement in the program and encouraging a stronger relationship between the national laboratories which have lead roles in the program and supporting university research teams. The Administration has flat-funded the program over the past several fiscal years and the Committee has taken issue with the Administration's insistence on emphasizing the basic research elements of the program with little support for engineering development of reactor systems. The program has four major subprograms: Applied Plasma Physics; Confinement Systems; Development and Technology; and Planning and Projects.

COMMITTEE ACTION

Applied Plasma Physics: +$2.5 million

The Committee recommends a $2.5 million add-on for the Los Alamos work on compact toroidal devices which offer low capital costs for fusion reactors if they are proven technologically feasible.

Confinement Systems: +$14.5 million

The Committee recommends a series of add-ons intended to support ongoing mainline projects as well as to provide for reorientation in some areas. +$7 million is recommended for the Advanced Toroidal Facility (ATF) at Oak Ridge with involvement of the University of Wisconsin; +$5.5 million is recommended for the MFTF-B project at Lawrence Livermore Laboratory and supporting mirror research at MIT; and +$2 million is recommended to retain the EBT-P project as a viable alternative concept through fiscal year 1984.

Development and Technology: +$6 million

The Committee recommends that $5 million of this add-on be allocated for acceleration of the Ion Cyclotron Resonance Heating (ICRH) activity. An additional $1 million is recommended for the development of first wall technology for compact, high-power density systems.

Planning and Projects: +$10 million

The Committee recommends that $5 million be allocated for the Tokamak Fusion Core Device (TFCD). $2 million of the $5 million is for the design center at Oak Ridge National Laboratory to pursue conceptual work and begin development of an engineering data base; the remaining $3 million is for the Princeton Plasma Physics Laboratory to independently contract for competitive teams to do conceptual design.4

The Committee also recommends an additional $5 million for the Fusion Materials Irradiation Test (FMIT) facility at Hanford, Washington. The Committee believes that a serious commitment must be sustained in this activity in order to encourage cooperative efforts with the Japanese on cost-sharing proposals for a comprehensive fusion materials program.

COMMITTEE VIEW

Magnetic Fusion Energy

The Committee believes that the Department must provide an increased emphasis on engineering aspects of the technology development program. The Committee's recommendation of additional funding is aimed at enhancing the level of industry and university involvement in the MFE program. The Committee is also concerned about the nature of industry involvement such that the activities assigned to industry should not be confined to service and support functions, rather increased involvement of industrial players in the planning and engineering design activities of the program should be encouraged. The Committee is also concerned about the nature of the national laboratory interaction with the university community and encourages the DOE to explore mechanisms for involving the universities more directly in support of the laboratory projects. This should be done in a way that allows for exploration of innovative concepts as well as training of critical engineering and scientific personnel for participation in the MFE program. The DOE should also explore mechanisms for data-sharing, access to the MFE computer network, and cost-sharing mechanisms for involving private sector entities which have not been previously supported by the MFE program.

5. ELECTRIC ENERGY SYSTEMS

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Electric field effects	$2,600	$2,000	+$1,000	$3,000
Power delivery (reliability R&D)	3,900	4,000	+2,000	6,000
Systems technology	10,200	6,600	+4,600	11,200
Program direction	500	102	+400	502
Subtotal, operating	17,200	12,702	+8,000	20,702
Capital equipment	0	0	+500	500
Total	17,200	12,702	+8,500	21,202

The Electric Energy Systems program includes research in determining the effects of electric power transmission on humans and animals; development of technology for improving the reliability of the transmission and distribution of electricity; and research and development in systems technology which encompasses the following activities: Superconducting Transmission; Ultra High Voltage Transmission; AC to DC conversion equipment; Materials Research; battery testing for utility "load leveling" applications; and communication within the control of the transmission and distribution of electricity.

COMMITTEE ACTION

The Committee recommends an increase of $8.5 million, including $500,000 for capital equipment not related to construction, for additional research and development work in Electric Energy Systems as follows:

1. An increase for Human Risk Analysis;
2. Continuing with the Emergency Detection and Control program;
3. Continuing with new concepts in reliability;
4. An increase for the Deep Water Submarine Cable;
5. An increase for Advanced Materials Research;
6. Funding for battery testing at the Battery Energy Storage Test (BEST) facility in New Jersey for "load leveling" applications; and
7. Continuing with work in Communication, Control and Operations.

The following amounts are authorized to be appropriated for the Project Tasks shown:

A. Electric field effects:	
Biological research	$1,500

Human risk analysis	1,500
B. Reliability R&D:	
Failure of insulating materials	3,000
Electromagnetic pulse	1,000
Emergency detection and control	1,000
New reliability concepts	1,000
C. Systems technology:	
Superconducting transmission	1,100
Deep water submarine cable	3,500
HVDC ion analysis	1,000
AC/DC systems	3,000
Advanced materials research	1,000
System efficiency	1,000
Communication, control and operations	1,100
D. Program direction	502
Total	21,202

COMMITTEE VIEW

Electric Energy Systems

The Committee is gravely disappointed in the reductions in personnel who are responsible for the Electric Energy Systems program. The Committee strongly believes that a staff of only four persons cannot adequately administer the Electric Energy Systems program, assure that the funds are properly spent, and coordinate the activities with non-federal agencies, including the Electric Power Research Institute (EPRI).

6. ENERGY STORAGE SYSTEMS

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Electrochemical energy storage	$18,000	$14,000	+$3,900	$17,900
Physical and chemical energy storage	7,000	0	+6,600	6,600
Program direction	700	200	+500	700
Subtotal, operating	25,700	14,200	+11,000	25,200
Capital equipment	0	0	+500	500
Total	25,700	14,200	+11,500	25,700

The Electric Energy Storage program includes performance of research, development and testing of electrochemical storage and conversion technologies, aimed at providing improved technology for electric vehicles and stationary storage applications, such as utility load management and as an integral part of solar energy systems.

COMMITTEE ACTION

The Committee recommends an increase of $11.5 million, including $500,000 for capital equipment not related to construction, for the following activities:

1. Continuing R&D on the lithium/metal battery;
2. Research on superconducting magnetic storage materals;
3. Research on chemical energy storage (hydrogen);
4. Research on thermal energy storage (phase change materials);
5. Battery systems testing with solar systems; and
6. Final close out and termination of seasonal thermal storage.

The Committee recognizes that certain projects should not be continued because the work has reached a point of maturity where the private sector can continue development. Inertial mechanical storage (fly wheels) is one such project. Another activity that has merit, but is dependent on local geological conditions, is underground thermal seasonal storage. While the Committee has recommended funds for this activity, the authorization is specifically intended to allow for an orderly close out and termination of the work.

The following amounts are authorized to be appropriated for the Project Tasks shown:

Program direction	$700
Electrochemical research	5,950

Sodium/Sulfur battery	3,850
Lithium/metal battery	500
Superconducting magnetic storage	600
Aluminum air battery	2,300
National battery test laboratory operations	1,800
Zinc bromine battery	2,000
Fuel cell research	1,100
Chemical energy storage (hydrogen)	2,500
Thermal energy storage phase change materials	2,500
Battery systems testing (solar charged)	900
Completion of seasonal thermal	500
Capital equipment	500
Total	25,700

7. SMALL-SCALE HYDROELECTRIC SYSTEMS

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Small-scale hydropower development	$750	0	0	0
Program direction	250	0	0	0
Total	1,000	0	0	0

Small-Scale Hydroelectric Systems is a DOE program aimed at capturing the use of energy available from small streams and lakes where the height of the "water fall" and flow rates are sufficient to produce electricity by means of an underwater turbine. While there are many opportunities for use of these relatively small turbines, which generally range in size from ½ to 15 megawatts electric (MWe), the limiting factor is economics, not technology. The turbine-generator equipment can be purchased commercially from United States and foreign sources and there appears to be little opportunity to improve on the systems which are available. No R&D funds are recommended for fiscal year 1984.

8. SUPPORTING RESEARCH AND TECHNICAL ANALYSIS

BASIC ENERGY SCIENCES

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
BASIC ENERGY SCIENCES				
Operating expenses:				
Nuclear sciences	$30,644	$37,900	0	$37,900
Materials sciences	108,700	125,110	0	125,110
Chemical sciences	70,000	75,500	0	75,500
Engineering, mathematical and geosciences	31,050	33,670	0	33,670
Advanced energy projects	8,300	9,100	0	9,100
Biological energy research	9,500	10,580	0	10,580
Program direction	3,100	3,970	0	3,970
Subtotal	261,294	295,830	0	295,830
Capital equipment	18,156	24,280	0	24,280
Construction	3,400	30,060	−$5,000	25,060
Total basic energy sciences	282,850	350,170	−5,000	345,170

Basic Energy Sciences, Construction

Project number	Description	Estimated total cost	Previous appropriation	Fiscal year 1984 DOE request	Authorization
84-ER-111	Beam lines and support area construction, National Synchrotron Light Source, Brookhaven National Laboratory.	19,700	0	2,500	2,500
84-ER-112	National Center for Advanced Materials, Lawrence Berkeley Laboratory and Stanford Linear Accelerator Center.	138,900	0	25,900	20,900
84-ER-141	Accelerator improvements and modifications, various locations.	1,260	0	1,260	1,260
84-ER-142	General plant projects various locations	400	0	400	400
	Total			30,060	25,060

The Basic Energy Sciences (BES) program supports basic research to broaden the technology base for present and future energy technologies. This program supports approximately 1200 research projects and provides advanced facilities that are used by university and industrial researchers as well as national laboratory scientists. Research is carried out in material sciences; chemical sciences; nuclear sciences, engineering, mathematical and geosciences; and biological energy research. An advanced energy project effort that crosscuts all disciplines is also included.

The fiscal year 1984 budget request for BES is $350.17 million. It provides for a cost of living allowance of $15.4 million and allows a modest $8.9 million growth in the various subprograms in the most promising new research areas. Included are the funds needed to meet increased costs for facility operations, and for equipment replacements and additions, as well as for program direction.

The fiscal year 1984 BES budget request provides for an Advanced Materials Research initiative of $38 million which includes two major construction projects and directly related research and equipment. The new construction projects are the National Center for Advanced Materials (NCAM) at Lawrence Berkeley Laboratory (LBL) and an expansion of the capabilities at the National Synchrotron Light Source (NSLS) at Brookhaven National Laboratory.

The request also includes an increment of $5 million for Heavy Ion Fusion Research, a program transferred to Basic Energy Sciences from the Office of Inertial Fusion, in the DOE Defense Programs.

COMMITTEE VIEW

The Committee notes DOE's decision to establish a premium coal sample bank at Argonne National Laboratory (ANL) under the Basic Energy Sciences Program. There already exists a similar coal sample bank activity carried out by the Pennsylvania State University (PSU) under the Fossil Energy Program. The Committee is concerned about potential duplication between the ANL and PSU activities and urges the Basic Energy Sciences and Fossil Energy Programs to coordinate these efforts to ensure that they are truly complementary.

COMMITTEE ACTION

The Committee reduced construction funding by $5 million for Project 84-ER-112, National Center for Advanced Materials, Lawrence Berkeley Laboratory and Stanford Linear Accelerator Center.

The Committee generally supports the Administration's advanced materials initiative including proposals for research facility construction at several national laboratories. In particular, the Committee supports the overall goals and concept of a unified "National Center for Advanced Materials" (NCAM) at Lawrence Berkeley Laboratory. However, the Committee is aware of concern within the scientific research community that there has not been sufficient time for an adequate review and discussion of the detailed proposal for NCAM.

In its eagerness to move ahead aggressively with the advanced materials research initiative, the Administration apparently has by-passed the preferred review process, which typically involves representatives of the research community. The Committee is aware that for a diverse field, such as materials science, it is difficult, if not impossible, to achieve a consensus when it comes to setting research priorities and allocating resources. Nonetheless, the Committee believes that DOE and the research community would have benefitted mutually from a thorough review and comment period prior to the submission of the NCAM proposal to Congress.

During the Committee hearings on the fiscal year 1984 DOE Authorization, Dr. Alvin Trivelpiece, Director of the Office of Energy Research, stated that he is establishing an ad hoc committee, which will include individuals from industry, national laboratories, and universities, to review the technical and programmatic aspects of NCAM. Because this facility is to be constructed over a period of 6 years, Dr. Trivelpiece claims that there is adequate time to make modifications that might grow out of recommendations from the ad hoc committee. DOE is directed to submit the ad hoc NCAM committee's findings and recommendations to the Committee as soon as they are available.

The Committee is also aware that additional NCAM workshops at LBL have been scheduled to solicit further advice from the research community.

Given the possibility of revisions in the NCAM construction plan, the Committee believes that it is prudent to slow the project during its first year. Consequently, the Committee recommends a reduction of $5 million (approximately 20 percent) in fiscal year 1984 construction funding. It is anticipated that this modest reduction in first year funding can be accommodated within the succeeding five year construction schedule. In any case no funds should be obligated for NCAM construction until the ad hoc committee has reported to DOE.

Further, the Committee recognizes that the total NCAM project funding (construction plus other project funding) is substantial ($174.1 million over 6 years), and that support for NCAM should not come at the expense of other worthy advanced materials research initiatives.

Finally, the Committee agrees with the Administration that LBL is an excellent institution for materials research and that strengthening its role and capabilities can be justified in light of DOE's policy to provide a lead mission for each of its major laboratories, as recommended by DOE's Energy Reseach Advisory Board in its report, *The Department of Energy Multiprogram Laboratories* (September 1982). Thus, the Committee believes that the Administration's LBL/NCAM proposal must be regarded also as an institutional building measure, and not only as an enhancement for an important research field.

The NCAM issue raises a more general problem for the Basic Energy Sciences Program: the need for improved long range planning and priority setting. The Committee directs that DOE, in conjunction with the appropriate scientific advisory groups, develop a long range plan for research priorities, facilities construction and operation, including a clear delineation of the respective DOE and national Science Foundation responsibilities in fields of common interest.

SUPPORTING RESEARCH AND TECHNICAL ANALYSIS

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
UNIVERSITY RESEARCH SUPPORT				
Operating expenses:				
University institutional research	0	0	0	0
University reactor fuel assistance	$1,600	$1,500	0	$1,500
University-Laboratory cooperation program	4,400	3,500	0	3,500
Energy manpower assessments	0	270	0	270
Energy graduate traineeships	0	0	+$1,000	1,000
Energy education and training	0	200	0	200
Subtotal	6,000	5,470	+1,000	6,470
UNIVERSITY RESEARCH INSTRUMENTATION				
Operating expenses	0	6,000	0	6,000
ENERGY SCIENCE ADVANCED COMPUTATION				
Operating expenses	0	0	+4,000	4,000

UNIVERSITY RESEARCH SUPPORT

The University Research Support (URS) program consists of two major subprograms. The University/National Laboratory Cooperative Research Program, is directed at strengthening the capabilities of both universities and national laboratories as major energy research performers in the conduct of long range energy research. Many of the activities supported within this subprogram involve joint efforts between university and Laboratory-based scientists. The second subprogram, the Energy Manpower Development Program, includes efforts to increase the number of students pursuing energy-related engineering and science careers. This subprogram also fulfills the statutory responsibility for assessing the supply and demand of manpower for both current and projected energy R&D programs. The fiscal year 1984 request for the URS program is $5.47 million.

COMMITTEE ACTION

The Committee added $1 million to reestablish the graduate traineeship program to support about 75 fellowships in energy-related fields at average annual stipends of about $10,000 each.

DOE initiated graduate traineeships in fiscal year 1982 at the $1 million level, however, no funds were included in fiscal year 1983 for the activity. A modest graduate traineeship program at $1 million per year would help meet the stated DOE goal for "increasing the number of students pursuing professional level degrees in energy-related science or engineering."

UNIVERSITY RESEARCH INSTRUMENTATION

A new program initiative is proposed for fiscal year 1984 as part of the combined public/private sector effort to help alleviate the serious national shortage of state-of-the-art scientific instrumentation in the major research universities.

The new instrumentation initiative will focus on those university reseach groups with demonstrated capability and experience in specific, designated research areas of primary concern to basic and technological energy research programs. Those groups supported will be assisted in obtaining the additional sophisticated instruments, each generally costing in excess of $100,000, which will enable them to more effectively conduct advanced research in the designated program areas. Awards will be made following a national competition.

The $6 million requested for fiscal year 1984 will enable some 20 to 30 university research groups to obtain some of the special equipment they require. This program will be coordinated with similar programs in other agencies.

COMMITTEE ACTION

No change.

ENERGY SCIENCE ADVANCED COMPUTATION

There is a large, unsatisfied demand for state-of-the-art, large-scale (Class VI) computational capabilities to solve important problems in physics, chemistry and mathematics within DOE's energy research programs. At the present time, very few scientists in the Energy Research programs, with the exception of Magnetic Fusion, have access to Class VI machines. A recent study conducted for the Office of Energy Research estimates a suppressed demand for at least one Class VI computer.

For fiscal year 1983 and fiscal year 1984, OER will not have the computing facilities to satisfy the Class VI computing requirements of the Energy Research programs. However, the Director of DOE's Office of Energy Research indicated in testimony before the Committee that, as an interim solution, he has assigned approximately five percent, 800 hours/years, of the Class VI time on the Magnetic Fusion Energy network to the remainder of the OER programs. Approximately 300 hours are to be available during fiscal year 1983. This time will be reimbursed by the user programs. By utilizing the existing network, OER is able to initiate service rapidly and provide state-of-the-art interactive computing on the most advanced scientific computers available not only to the DOE laboratories but to universities and industrial contractors as well. Time will be allocated based on the scientific merits of the problems to be addressed.

OER is currently examining alternatives for more adequately meeting the computing requirements of the Energy Research programs. An optimum solution would likely be based on a centralized computing facility and a communications network to service the many geographically dispersed contractors. Based on OER experience with the Magnetic Fusion Energy network, one estimates an annual operating cost of $11 to $13 million, including the lease of a Class VI computer, and a capital equipment budget of about $2 million. The actual costs would depend on siting of the computing center, configuration of the network and details of the services to be provided.

COMMITTEE ACTION

The Committee added $4 million for a distinct programmatic support activity to provide advanced computational resources (Class VI computers) for research supported by DOE's Office of Energy Research (Basic Energy Sciences, High Energy and Nuclear Physics, and Biological and Environmental Research).

The Committee created a new budget line to provide proper emphasis for this essential activity and to allow for necessary growth in future years without burdening the existing research programs. The new line program would provide approximately 800 hours of advanced computation support on a more permanent basis starting in fiscal year 1984.

For fiscal year 1985 and beyond, the Committee encourages DOE to pursue its optimum solution based on a centralized computing facility (or facilities) and the associated communications network.

OTHER SUPPORTING RESEARCH AND TECHNICAL ANALYSIS ACTIVITIES

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
OTHER PROGRAMS AND ACTIVITIES				
Operating expenses:				
Energy research analysis	$2,825	$2,869	0	$2,869
Program direction and oversight	2,603	3,400	0	3,400
Multi-Program general purpose facilities various locations, construction	34,000	40,600	0	40,600
SUMMARY: SUPPORTING RESEARCH AND TECHNICAL ANALYSIS				
Operating expenses	272,721	313,569	+$5,000	318,569
Capital equipment and construction	55,556	94,940	−5,000	89,940
Total, program	328,277	408,509	0	408,509

ENERGY RESEARCH ANALYSIS

The Energy Research Analysis program provides DOE with the capability for independent, objective analysis of the agency's technical needs and opportunities; including coordination and direction in interagency activities such as acid rain, and support to agency advisory groups such as the Energy Research Advisory Board (ERAB). These activities are carried on through studies, workshops, panels and other mechanisms which permit the agency to make use of the best available scientific and technical talent both inhouse and from industry and academia. The fiscal year 1984 request for this support program is $2.869 million.

COMMITTEE ACTION

No change.

ADVISORY AND OVERSIGHT PROGRAM DIRECTION

This program provides the personnel resources required by the Director of Energy Research to carry out his responsibilities under legislation (Public Law 95-91) and as mandated by the Secretary in areas beyond the scope of the other assigned Energy Research programs. This responsibility includes advising on research activities carried out by any of the Assistant Secretaries; providing support for the Energy Research Advisory Board and the Field and Laboratory Coordination Council; and providing program management of the Energy Research Analysis, University Research Support, and Multiprogram General Purpose Facilities (MGPF) programs and the University Research Instrumentation Initiative. The fiscal year 1984 request for this support activity is $3.4 million.

COMMITTEE ACTION

No change.

MULTIPROGRAM GENERAL PURPOSE FACILITIES, CONSTRUCTION

Project number	Description	Estimated total cost	Previous appropriation	Fiscal year 1984 DOE request	Authorization
80-ES-11	Idaho Laboratory Facility, Idaho National Engineering Laboratory.	$18,000	$16,938	$1,062	$1,602
81-E-325	Engineering Technology Laboratory, Sandia National Laboratories.	17,600	12,000	1,600	3,600
82-E-301	300 Area Critical Utilities, Richland Operations	11,600	7,200	4,400	4,100
82-E-302	Security Facility, Argonne National Laboratory	8,100	4,700	2,300	2,300
82-E-305	Traffic Safety Improvements, Richland Operations	6,200	5,400	800	0
83-E-308	Rehabilitate Power Systems, Oak Ridge, Idaho, Richland & Lawrence Livermore National Laboratories.	15,830	5,000	7,988	7,988
83-E-309	Electronics Facility, Argonne National Laboratory	8,500	1,200	4,150	4,150
83-E-310	Utility Replacements & Upgrade, Brookhaven National Laboratory.	12,000	1,300	7,500	7,500
83-E-311	Emergency Response Center, Oak Ridge National Laboratory.	4,200	2,000	2,200	2,200
84-ER-101	Rehabilitate Old Town Area Utilities, Lawrence Berkeley National Laboratory.	4,700	0	1,000	1,000
84-ER-102	Cooling Water Facilities Oak Ridge National Laboratory.	4,000	0	600	600
84-ER-103	Road Repair, Richland, Lawrence Berkeley, Idaho and Argonne National Laboratories.	16,000	0	3,000	3,000
84-ER-104	Facilities Support Project, various laboratories sites	4,000	0	4,000	4,000
	Total			40,600	40,600

The goal of the Multiprogram General Purpose Facilities (MGPF) program is to provide for the rehabilitation and replacement of multiprogam general support facilities which are essential to the continued operations of the agency's multiprogram sites. Multiprogram General Purpose Facilities are facilities which are suited for and utilized by many different programs where no one program uses more than approximately 60 percent of the facility. These include roads, railroads, site utilities, and support buildings such as laboratories, office buildings, shops, warehouses, etc.

The following facilities and sites are included in the program:

Ames Laboratory.

Argonne National Laboratory (ANL).
Brookhaven National Laboratory (BNL).
Hanford Engineering Development Laboratory (HEDL).
Idaho National Engineering Laboratory (INEL).
Lawrence Berkeley Laboratory (LBL).
Lawrence Livermore National Laboratory (LLNL).
Los Alamos National Laboratory (LANL).
Oak Ridge National Laboratory (ORNL).
Pacific Northwest Laboratory (PNL).
Richland Operations (RL).
Sandia National Laboratories (SNL).
Savannah River Laboratory (SRL).

The specific objectives of the program from fiscal year 1984 to fiscal year 1988 are to rehabilitate and replace deficient facilities which are essential to the continued operations of multiprogram sites, and to prolong the life of the government's large investment in real property facilities at these sites. The fiscal year 1984 request for MGPF is $40.6 million.

COMMITTEE ACTION

The Committee increased the fiscal year 1984 authorization for Project 81-E-325, Energy Technology Laboratory, Sandia National Laboratories, Albuquerque, New Mexico by $2,000,000. In doing so, the Committee noted that Project 82-E-305, Traffic Safety Improvements, Richland, Washington did not need an additional authorization of $800,000. Furthermore, through good project management by the Department of Energy and its contractors, and because of a recession in the Richland area, the total estimated cost of this project is not expected to exceed $4,200,000. Therefore, the project is already over authorized by at least $1,200,000.

To preserve the integrity of H.R. 2587, the committee also decided to defer $1,200,000 on Project 82-E-301, 300 area critical utilities upgrading, Richland, Washington, with the understanding that the Department of Energy may want to reprogram funds from Project 82-E-305, or from such other projects as may be feasible, to Project 82-E-301 in the future.

The Committee emphasizes that the action taken to defer $1,200,000 from Project 82-E-301 was done to simplify H.R. 2587 and should not be construed as a lack of support for the utilities work at Richland, Washington.

9. ENVIRONMENTAL R&D

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority estimate	1984 DOE authorization request	Changes to DOE authorization request	Total authorization
Operating expenses:				
Environment, safety and health	$37,495	$38,775	+$1,600	$40,375
Biological/environmental research	174,243	161,500	+51,350	212,850
Subtotal operation expenses	211,738	200,275	+52,950	253,225
Capital equipment	13,477	9,300	+3,825	13,125
Construction	2,000	1,000	0	1,000
Total program	227,215	210,575	+56,775	267,350

The Department of Energy's Environmental Program was established to assure that the environmental research, assessment, and control issues related to current and developing energy technologies are addressed effectively. The Program is divided into two major categories: Environment, Safety and Health and Biological and Environmental Research.

The principal focus of the Environment, Safety and Health activities has been recently sharpened to strongly emphasize environmental protection, safety, health protection and quality assurance in the Department of Energy's operations. The Department's nuclear energy and defense programs have received particular attention. The refocusing began as a result of a Departmental examination of safety lessons that could be learned from the Three Mile Island incident, and which could be applied to the operation of DOE nuclear facilities.

Human health effects and environmental consequences from new and existing energy sources are concerns shared by the whole country. The Biological and Environmental Research program is the only long-term, multidisciplinary research effort in the Federal Government specifically devoted to the range of environmental and health issues anticipated in the expansion of existing energy technologies, or in developing new sources of energy. The goals of this research are to identify, before a technology is locked into place, the early and late effects, if any, on human health and the environment. Answers to these questions, if obtained early enough, will permit energy requirements to be met with minimum damage to human health and the environment, will prevent the expenses associated with unnecessarily restrictive regulations, and will avoid unanticipated constraints arising at a later time.

The Committee has recommended an increase above the Administration's request in the Environment, Safety and Health program. Detailed explanations for the changes are contained in the section on "Committee Actions," but the general reason for this program increase was to continue the non-nuclear environmental activities. The increases in the Biological and Environmental Research programs were generally directed toward the continuation of the studies in the impact of fossil and synthetic fuel technologies on health and the environment. The nuclear research activities in the environmental programs have been maintained at a relatively constant level of effort since 1982. On the other hand, most of the budget reductions have been in non-nuclear programs. The Committee concludes that research into the health and environmental impact of energy-related technologies should include both nuclear as well as non-nuclear studies.

SUMMARY OF COMMITTEE ACTIONS

The Committee recommends that the Nuclear Safety program element be funded at a level of $11,500,000 which is $2,000,000 below the Administration's request. In fiscal year 1983 the program increased twenty percent over the previous year, and the fiscal year 1984 budget request was an increase of thirty percent over the 1983 level. The Committee recognizes the importance of maintaining an excellent nuclear safety program, however, it was concluded that this 50 percent growth over two years exceeded the capacity to efficiently and effectively accommodate these program increases.

The Committee recommends that the Operating Safety program be funded at a level of $17,000,000 which is $2,200,000 above the Administration's request. The increase is directed toward enhancing the program activities in the inventory of non-nuclear hazardous wastes and toxic materials and in the methods for managing these wastes and materials. The Committee is concerned that the program maintain safety activities in non-nuclear areas at a level that would enable the Department to respond to safety related problems. Additionally, the Committee directs that $3,000,000 of the amount authorized for this program be used to establish a liquified gaseous fuel safety program.

A $1,400,000 increase above the Administration's request for the Environmental Compliance program is recommended by the Committee. The recommended level is $3,000,000. This program has the responsibility to insure DOE compliance with the National Environmental Policy Act (NEPA) and other environmental requirements. Over the past two years the program has been reduced by 47 percent while the number of NEPA documents reviewed has increased. In order to ensure that the program level is sufficient to allow adequate review of the NEPA activities, the Committee directs the funding increase to this activity.

The Committee recommends that the Capital Equipment program be funded at a level of $13,125,000 which is $3,825,000 above the Administration's budget request. The Program's activities are conducted at 7 national laboratories and at 16 dedicated Department-wide contractor facilities. In addition, these national laboratories are utilized by other federal agencies. The Committee feels that it is necessary to replace obsolete equipment as well as maintain state-of-the-art capability in research and emergency equipment and directs the increase toward these purposes.

The budget level recommendation for the Human Health research program is $29,350,000 which is $4,921,000 above the Administration's request. The Committee expresses concern that research efforts in human cancer are being decreased. Because these studies are conducted in coordination with other federal agencies, there is no duplication of effort, the Committee concludes that this important research should be continued and directs the increase toward this effort.

The Committee also recommends that research into the human health impact of fossil and synthetic fuels be continued at the fiscal year 1982 level of effort.

The Committee recommends that the Health Effects Biology research program be funded at $68,000,000 which is $16,113,000 above the Administration's budget request. The increase raises the budget for this program to the 1982 funding level.

Specifically, the Committee recommends that the $16,113,000 be directed toward the study of the health impact, including cancer, of fossil and synthetic fuel technologies. These long-term research programs have been decreased since 1982 without justification. Yet, there has not been a corresponding decrease in either energy use nor in energy production during this time.

The Office of Technology Assessment has stated that in 1982, U.S. energy use was down 4.3 percent from 1981 and down over 10 percent from 1979, the year in which U.S. energy use was at an all time high. In parallel with the decline in demand we have seen a modest increase in domestic energy production since 1975, although it has leveled off since 1980, the peak year.

Moreover, Agency witnesses testified that they do not have long-term plans for this or any other program in the Biological and Environmental Research program.

Therefore, because of the importance of the research program and the lack of Agency justification, the Committee recommends that the studies in the health impact of fossil and synthetic fuel technologies be continued at the 1982 level of effort. Further, the Committee recommends that increased emphasis be placed on cancer related studies.

In the Environmental Research program, the Committee recommends an increase of $11,105,000 over the Administration's budget request. The recommended level is $33,700,000. The increase was directed toward the continuation of studies in the environmental impact of fossil and synthetic fuel technologies. (See discussion above.) The Committee expresses concern that the decrease in long-term toxic chemical studies had not been justified by Agency witnesses. Moreover, it was felt that the programs are of such high priority that they should be continued.

The Committee recommends that the Physical and Technological research program be funded at a level of $36,200,000 which is $10,211,000 above the Administration's budget request. The recommended level is equivalent to the 1982 budget level. The Agency's request reduced basic research in molecular biology and decreased studies in the identification and characterizaiton of toxic chemicals from energy-related materials. The Committee requests that these programs be continued especially in the non-nuclear energy studies.

The Carbon Dioxide and Climate program was increased $2,000,000 over the Administration's request, by Committee action, with a recommended budget level of $14,000,000. The Department is the designated lead Federal agency in carbon dioxide activities. Over the past 2 years, several hearings have focused on this program. The Committee finds, as a result of these investigations, that the program should accelerate the research activities in carbon cycle studies and the recommended increase is directed toward this effort.

The Committee recommends that the Risk Analysis program be funded at a level of $4,000,000, an increase of $4,000,000 above the Administration's request. The Committee finds that the program, designed to analyze potential long-term health and ecological impacts of advanced energy technologies, is important and should be continued. Further, the Committee recommends that the program be maintained at the 1982 level.

The Committee recommends that the nuclear medicine research program be funded at a level of $24,000,000 which is $3,000,000 over the Administration's request. This important program element, in which research is directed toward studies in biomedical issues and in clinical medicine, has not increased in budget level since 1981. The Committee directs the increased level of $3,000,000 toward diagnostic and treatment studies in heart and cancer problems.

ENVIRONMENT, SAFETY AND HEALTH

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority estimate	1984 DOE authorization request	Changes to DOE authorization request	Total authorization
Operating expenses:				
Nuclear safety	$10,375	$13,500	−$2,000	$11,500
Quality Assurance and Standards	1,725	900		900
Operating safety	16,545	14,800	+2,200	17,000
Environmental Compliance	1,500	1,600	+1,400	3,000
Environmental Analysis	2,000	2,600		2,600
Program Direction	5,350	5,375		5,375
Subtotal	37,495	38,775	+1,600	40,375
Capital equipment	1,500	1,600	+400	2,000
Total	38,995	40,375	+2,000	42,375

The Environment, Safety and Health Program (ES&H) provides an independent overview and assessment of the Department's management of contractor-operated facilities to assure safe and healthful workplace conditions, the safety and health of the public, protection of the environment, and compliance with applicable ES&H-related statuory and regulatory requirements in the Department's facilities and operations. The program also assures that energy issues compatible with national energy goals are considered in the development of proposed environmental requirements.

The responsibility of the program is met through the following principal activities:

1. Nuclear safety.—The nuclear safety program assures an independent, aggressive safety overview of the Department's complex, which includes 84 nuclear reactors and criticality facilities and over 200 other diverse and highly technical nuclear process facilities, with replacement value of tens of billions of dollars.

2. Quality assurance and standards.—The objective of quality assurance policy as practiced in DOE is to assure that research and production activities are performed in a controlled manner, that components, systems, and processes are designed, developed and operated according to appropriate quality assurance requirements. Such requirements are typically defined by national standards. Assurance is provided principally through internal policy coordination and the regular performance of independent overview and management appraisals.

3. Operational safety.—The goal of the operational safety program is to assure that the Department of Energy is in conformance with environmental protection, safety, and health protection policies, laws and principles, and that the Department maintains high quality performance levels in its operations. The overall performance of DOE in regard to environment, safety and health is assessed through collection and analysis of monitoring and incident data for DOE field and headquarters operations.

4. Environmental compliance.—The environmental compliance element implements an independent review program to assure Department compliance with NEPA and other environmental requirements bearing on project development activities. NEPA and implementing regulations require that Federal agencies prepare and consider in decisionmaking NEPA review documents, i.e., environmental impact statements and environmental assessment.

5. Environmental analysis.—The environmental analysis program provides a Departmental focal point for analysis of current and emerging environmental issues, laws, regulation, and technologies that impact U.S. energy supply and Departmental policies, plans, programs, and facilities. It analyzes and coordinates Department response to regulatory proposals that may impact energy activities.

6. Program direction.—This program element includes the salaries for 95 full-time equivalent personnel, lump sum payments upon retirement, overtime, equalization pay, incentive awards, and severance pay. Also included in this activity, are the normal agency contributions to benefits and the travel directly related to program accomplishments.

7. Capital equipment.—This program element is in support of the environment, safety and health programs' operating activities conducted at 7 national laboratories and 16 dedicated Department-wide contractors. A wide variety of capital equipment is required to pursue the diverse program of research and assessment of environment, safety and health impacts of energy production.

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

[Dollars in thousands]

	Fiscal year 1984 DOE authorization request	Committee action	
		Changes to DOE authorization request	Total authorization
Operating expenses:			
Human health research	$24,429	+$4,921	$29,350
Health effects biology	51,887	+16,113	68,000
Environmental research	22,595	+11,105	33,700
Phys and Tech research	25,989	+10,211	36,200
Co_2 and climate	12,000	+2,000	14,000
Risk analysis	0	+4,000	4,000
Nuclear medicine	21,000	+3,000	24,000
Program direction	3,600		3,600
Subtotal	161,500	+51,350	212,850
Capital equipment	7,700	+3,425	11,125
Construction	1,000		1,000
Total	170,200	+54,775	224,975

The Biological and Environmental Research program is the Department's program that addresses the health and environmental issues considered to be relevant to the expansion of existing energy technologies or development of alternative energy options. The goals of this research program are to determine, at an early time, whether significant near-time or late biological or environmental effects are associated with the energy technologies in question. Answers to these questions, if obtained early enough, will make it possible for the Nation to meet its energy requirements with minimum damage to human health and environment. In addition, decisions based on information gained through our program can avoid unnecessarily restrictive and cost-effective environmental regulations.

1. Human health research.—The principal objective of the human health research subprogram is to determine whether exposure of humans to agents associated with energy production and use results in health effects, such as cancers and genetic defects. Since these effects may not manifest themselves until years after exposure, long-term epidemiological studies of relatively large numbers of exposed and unexposed individuals must be followed to determine whether correlations between exposure to energy-related pollutants and disease incidences actually exist.

2. Health effects research.—Human health risks should be estimated from data obtained in studies of human responses to toxic agents. However, for legal and ethical reasons, prospective experiments using toxic agents are seldom done on humans. Therefore, existing human data are rarely adequate to make reliable health-risk estimates. Human epidemiological data must be supplemented with information from studies of animals and other living systems.

This applied and basic research program is broad and multidisciplinary in scope and often requires unique experimental facilities. Its objective is to identify protentially toxic physical and chemical agents associated with energy technologies to determine, in experimental systems, the effects produced, if any, following exposure to these agents. Emphasis if placed on determining the delayed biological effects that are induced by long-term exposures to low concentrations of toxic agents. Three categories of health effects are investigated: cancer, genetic damage, and toxicity to functional systems of the body.

3. Environmental research.—The goal of the environmental research program is to obtain information on mechanisms which control and influence total ecosystems and the critical elements within them. With such information appropriate siting and disposal of materials from energy systems can be made that are both cost effective and environmentally safe. To obtain this information base, an interdisciplinary research program in terrestrial and aquatic systems is conducted in different climatic regions and in offshore regions along the coasts of the United States.

4. Physical and technological research.—This subprogram constitutes the physical sciences component of the health and environmental research program. It ranges from fundamental research into the physical mechanisms that underlie radiation and chemical interactions in biological systems to applied analytical chemistry studies which define the chemical species that are responsible for observed biological activity. This subprogram also includes the atmospheric science research which is striving to improve the capability for describing the transport and transformation of energy-related materials in the atmosphere. Finally, the measurement sciences program is developing advanced instrumentation techniques for health protection, materials characterization, and biomedical research purposes.

5. Carbon dioxide research.—The carbon dioxide research program is designed to develop a sound, quantitative atmospheric carbon dioxide knowledge base to aid in energy policy decision making. This program is designed to improve our understanding of the fundamental scientific relationships between carbon dioxide concentration and climate; this will be accomplished by increased data collection, improved measurements, and developments of reliable models. With such data, questions about the relationships between future atmospheric levels of carbon dioxide, the magnitude of climate change and the responses of crops and ecosystems to higher carbon dioxide levels can then be answered with confidence.

6. Health and environmental risk analysis.—The objective of this program is to support the formulation and management of environmental research by providing realistic analyses, based on current information, of concerns regarding potential long-term health and ecological impacts of advanced energy technologies. By identifying critical sources of uncertainty underlying potential environmental concerns, these analyses assist in formulating and managing a program of environmental research focused on identifying the more critical research data needs.

7. Nuclear medicine applications.—Nuclear medicine is the branch of medicine concerned with the use of radioactive and stable isotopes in biomedical research and clinical medicine. The Department of Energy supports research in nuclear medicine by bringing together physicists, chemists, biologists, engineers and physicians to develop medically useful isotopes, isotope-labeled pharmaceuticals and instrumentation to the level where they are clinically validated. The nuclear techniques which have been developed in this subprogram for diagnostic purposes has changed the practice of medicine. They have reduced the need for invasive procedures and exploratory surgery, made hospital stays shorter, less painful and dangerous, and have greatly expanded the physician's arsenal in his fight against disease and suffering.

8. Capital equipment.—The capital equipment request for this program is for pursuing the diverse areas of research on health and environmental issues associated with the numerous energy technologies under consideration and to continue high quality research and advances in the development of nuclear medicine technology.

9. Construction.—Construction funds are requested in support of the biological and environmental research program's general plant projects.

10. POLICY AND MANAGEMENT, ENERGY RESEARCH

The Fiscal Year 1984 budget request for Policy and Management—Energy Research is $515,000, a decrease of $735,000 from fiscal year 1983. These funds are required to provide for the salaries and related expenses associated with 8 full-time equivalents in the Office of the Director, Office of Energy Research, and the Office of Management. This staffing level represents a decrease of 12 full-time equivalents below the revised fiscal year 1983 level. The requested funding will provide for the normal increased personnel costs of 8 FTE's such as within-grade and merit increases and benefits. The funding further reflects the impact on average salaries of the fiscal year 1982 and fiscal year 1983 pay cap increases and two general pay increases in fiscal year 1982 and fiscal year 1983.

This staff provides overall high level management and direction for the Office of Energy Research responsibilities carried out under the following specific programs: High Energy Physics; Nuclear Physics; Biological and Environmental Research; Magnetic Fusion Energy; Basic Energy Sciences; Energy Oversight, Research Analysis and University Support; Multiprogram General Purpose Facilities; and the new University Research Instrumentation Initiative.

In addition to directing the Office's research programs cited above, the Director, Energy Research, also serves as the principal science advisor in formulating basic research policy. In this capacity, the Director provides independent reviews, analyses and recommendations concerning a wide range of activities which require scientific counsel. These activities include, for example, national research and development strategies, plans and policies, including budgetary priorities for energy research and development programs. They also include advising on policy issues regarding the best utilization of the nonweapons multipurpose laboratories assigned to Energy Research for oversight and management. These advisory and oversight responsibilities are carried out through meetings with top managment and program officials as necessary throughout the year; interactions with laboratories; presentations to the Energy Research Advisory Board; participation in Congressional hearings; and interactions with the scientific community as a whole.

The Office of Management is responsible to the Director to ensure that Energy Research managment structures, procedures, and program planning and budgeting systems are responsive to agency requirements for effective, efficient, and economical achievement of planning goals and program objectives. The staff funded from this program provides the principal managerial direction to all administrative, financial, procurement, and construction management oversight activities of the Office of Management.

COMMITTEE ACTION

No change.

D. GEOTHERMAL RESOURCES DEVELOPMENT FUND

The goal of the program is to minimize financial risk so that private sector credit can be made available for geothermal projects. Further, the program strives to develop normal borrower-lender relationships which will provide financing of geothermal projects without federal assistance.

The Geothermal Loan Guarantee Program is authorized under the Geothermal Energy Research, Development and Demonstration Act of 1974 (P.L. 93-410), as amended by both the Department of Energy Act of 1978—Civilian Applications (P.L. 95-238) and the Energy Security Act of 1980 (P.L. 96-294).

The Administration's FY 1984 request for managing the fund is $2.1 million.

COMMITTEE VIEW

The Committee has been a strong supporter of the Geothermal Loan Guarantee program. Especially in the West, geothermal resource development with current technology can make a significant contribution to electric power capacity in the next few years. The DOE program has been very successful in sponsoring several projects which would not otherwise have been able to find private sector financing. At the same time, no federal outlays are likely to be required.

However, general economic conditions and a better understanding of the resources made it likely that current and future projects in the program may need to restructure their financial packages. The Committee directs the DOE to be flexible in its approach to such restructuring. This includes the possibility of increasing the size of the loan guarantees within the statutory limits of the program.

E. GENERAL SCIENCE AND RESEARCH

1. HIGH ENERGY PHYSICS

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorizaton
Operating expenses:				
Physics research	$92,174	$101,500	0	$101,500
Facilty operations	152,100	166,000	0	166,000
High energy technology	76,000	82,000	0	82,000
Subtotal	320,274	349,500	0	349,500
Capital equipment	46,372	51,500	0	51,500
Construction	55,500	89,000	0	89,000
Total high energy physics	422,146	490,000	0	490,000

High Energy Physics, Construction

Project No.	Description	Estimated total cost	Previous appropriation	Fiscal year 1984 DOE request	Authorization
81-E-218	Tevatron I, Fermilab	$82,500	$38,000	$20,000	$20,000
82-E-206	Tevatron II, Fermilab	49,800	24,000	13,000	13,000
78-10-b	Intersecting Storage Accelerator (Isabelle), Brookhaven National Laboratory.	(1)	130,500	0	0
84-ER-133	Stanford Linear Accelerator Center Linear Collider (SLC).	112,000	0	40,000	40,000
84-ER-131	Accelerator improvements and modifications, various locations.	9,000	0	9,000	9,000
84-ER-132	General plant projects	7,000	0	7,000	7,000
	Total			89,000	89,000

(1) Under review.

The High Energy Physics program supports research to more fully understand the nature and relationships among the four fundamental forces of nature and to understand the ultimate structure of matter in terms of the properties and interactions of its basic constituents.

High Energy Physics is dependent on the availability of large, complex particle accelerator and colliding beam facilities, as well as on the sophisticated detectors that record the effects of particle collisions. Progress in the field depends on a continuing interplay of advancements in experiment, theory and technology.

The FY 1984 budget request for Operating Expenses of $349.5 million would provide for the first full year of operation of the Energy Saver superconducting synchrotron at Fermilab. The Energy Saver, the first stage of a multi-step development program, will reduce electric power needs and extend the operational energy of the accelerator.

Priority also would be given to good operation and research use of PEP, the 15 GeV × 15 GeV electron-positron colliding beam facility at Stanford Linear Accelerator Center (SLAC).

The FY 1984 Operating Expenses request would provide strong continuing support for university research groups, non-accelerator experiments and theoretical research efforts. It also includes funding for Brookhaven National Laboratory (BNL) to continue to develop accelerator-quality superconducting magnets, to develop and demonstrate techniques for fabricating the magnets reliably, and to consider lower cost magnet options. Funding is also provided to develop alternative facility designs that would use the tunnel now in existence at BNL.

The Capital Equipment request of $51.5 million gives priority to Fermilab for equipment related to the major detector for colliding beam experiments at Tevatron I and for secondary beam line components and detectors for 1000 GeV experiments at Tevatron II, and to SLAC for work on a detector for SLAC Linear Collider (SLC) research.

The FY 1984 Construction request is for $89 million, an increase of $33.5 million over FY 1983. A major portion of this request is to initiate construction of the SLC on a rapid schedule. The goal of this project is to develop and demonstrate the practicality of using linear accelerators with precisely controlled, high intensity and highly focused beam pulses to provide high luminosity electron-positron or electron-electron collisions at energies far beyond those that will be affordable for circular colliders. Completion of the SLC on a three year construction schedule will give the U.S. earliest access to copious production of previously unidentified particles called the W and the Z^0.

Also included in the Construction request is the continuation of the Tevatron I and II projects at Fermilab. These projects comprise the second and third stages of the multi-step development program. Tevatron I permits acceleration up to 1000 GeV and will provide a facility for proton-antiproton collisions at 2000 GeV. Tevatron II will further expand the accelerator's capabilities by providing upgrading of experimental areas and beam lines external to the main ring for fixed target experiments.

COMMITTEE ACTION

Brookhaven National Laboratory (BNL) is preparing a proposal for a proton-proton Colliding Beam Accelerator (CBA) to build on the existing investment at BNL. This proposal is expected to be submitted to DOE by March 30, 1983.

A 1983 High Energy Physics Advisory Panel (HEPAP) Subpanel on Long Range Planning has been formed and has been charged by DOE to give a definite recommendation regarding the BNL CBA. The Subpanel will conclude its review on June 5–11, with a meeting at Woods Hole. The report resulting from the Subpanel's deliberations will be reviewed by HEPAP at its meeting on June 29–30, 1983. HEPAP will then forward the report to DOE with their comments and recommendations.

DOE will make its final decision concerning the Colliding Beam Accelerator facility in July 1983. However, the Committee notes that no FY 1984 construction funds have been requested for CBA, and that the Administration has no plans to request supplemental funds for the facility.

The Committee recommends that, should HEPAP report favorably concerning the CBA, up to $10 million shall be made available from the total of $643 million in General Science and Research for the construction activities at the facility.

2. NUCLEAR PHYSICS

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Low energy nuclear physics	$12,257	$13,000	0	$13,000
Medium energy nuclear physics	52,258	59,000	0	59,000
Heavy Ion nuclear physics	39,700	47,000	0	47,000
Nuclear theory	8,150	9,000	0	9,000
Subtotal	112,365	128,000	0	128,000
Capital equipment	10,444	11,300	0	11,300
Construction	7,700	13,700	0	13,700
Total nuclear physics	130,509	153,000	0	153,000

Nuclear Physics, Construction

Project No.	Description	Estimated total cost	Previous appropriations	Fiscal year 1984 DOE request	Authorization
84-ER-110	University accelerator upgrade project at University of Washington (Seattle) and Yate University.	$19,000	0	$8,000	$8,000
84-ER-121	Accelerator improvements and modifications, various locations.	3,500	0	3,500	3,500
84-ER-122	General plant projects, various locations	2,200	0	2,200	2,200
	Total			13,700	13,700

The Nuclear Physics program supports research to attain a better understanding of the structure and properties of atomic nuclei and the forces that govern their behavior and to determine how the quark substructure of protons and neutrons influences the make-up of nuclei. Nuclear Physics, like High Energy Physics, makes use of advanced particle accelerator facilities.

Of the $128 million Operating Expenses request for fiscal year 1984, $66.3 million is needed for operation of Nuclear Physics accelerator facilities, with $12 million of this for electric power costs. DOE claims that this funding will allow use of facilities at the same utilization levels as achieved in fiscal year 1982. The remainder of the Operating Expenses request is for experimental research ($52.7 million) and theroetical research ($9 million).

In fiscal year 1984, $11.3 million is requested for Capital Equipment. Of that, $10.5 million is needed to acquire experimental and computational equipment used by research scientists as well as equipment which permits effective operation of the accelerators themselves.

To maintain the scientific strength and attractiveness of university-based nulcear physics facilities to students, these facilities must be maintained at scientifically competitive levels. In the fiscal year 1984 request for construction funds, $8 million is planned for upgrade of on-campus accelerator facilities at Yale University and the University of Washington (Seattle). The upgraded facilities will allow continuation of the excellent records of scientific productivity and academic preeminence of these outstanding institutions.

COMMITTEE VIEW

The Committee is concerned that the nuclear physics accelerator facilities operate at their planned utilization levels in fiscal year 1984. This can only be achieved if sufficient funding is included in the nuclear physics budget for facility operations. The DOE budgeting process must adequately estimate facility operating costs, including personnel, electric power, maintenance and overhead costs. The budget also must estimate true annual escalation in these costs.

In the past, DOE has not adequately budgeted for accelerator operations at certain facilities, and Congress has been obliged to add or redirect funds from other activities to meet projected utilization schedules. It has come to the Committee's attention that this situation will recur for fiscal year 1984.

The problem is most serious for the Clinton P. Anderson Meson Physics Facility (LAMPF) at Los Alamos National Laboratory (LANL) and the Super HILAC/Bevalac at Lawrence Berkeley Laboratory (LBL), which together account for about 75 percent of the nuclear physics facility operations budget. For example, DOE has requested $30.8 million in the Nuclear Physics program for fiscal year 1984 accelerator facility operations at the LAMPF facility. DOE projects that $30.8 million in fiscal year 1984 will allow LAMPF to operate approximately 3,000 beam hours (1982 utilization level) for research.

At the Committee's request, the DOE provided their understanding of Los Alamos-based calculations which indicate that an additional $2.7 million is required for 3,000 beam hours in fiscal year 1984. The difference between the two calculations apparently lies in the cost factor indices assumed. DOE bases its indices on OMB guidance, which provides significantly less than the current Los Alamos cost factor estimate for its operations, which is based on local power rates, procurement and guidance from the University of California, the LANL operator.

A similar discrepancy occurs in the escalation estimate for Super HILAC/Bevalac operations at LBL, which is also operated by the University of California. The resulting shortfall for fiscal year 1984 Bevalac operations has been calculated by LBL to be at least $2.3 million.

Since LAMPF supplies proton beams, not only for Nuclear Physics research, but also for Defense Programs and Basic Energy Science activities, proper accounting for LAMPF operations is complicated. In the past, the shortfall in LAMPF operations funding has been corrected by redirecting appropriated funds from the DOE Defense-related programs. The Super HILAC/Bevalac discrepancy has not been corrected in the past.

The Committee has no reason to believe that the Laboratories have misrepresented their operations costs and concludes that DOE and OMB have chosen to impose escalation rates not based on actual laboratory experience. At the same time, the budget justification documents state that the Laboratories can achieve the desired levels of operation in fiscal year 1984 based on these lower funding levels.

In order to ameliorate the LAMPF shortfall in fiscal year 1984, the Committee would encourage the Armed Services and Appropriations Committee, as they have in prior years, to make available additional funds (approximately $3 million) for LAMPF operations from the Defense programs.

For the longer term the Committee directs DOE, in conjunction with OMB and the Laboratories, to establish a rational budgeting strategy for nuclear physics facilities, especially LAMPF and Bevalac, beginning in fiscal year 1985. The strategy should include a more realistic estimate of cost factors, including escalations, which are more closely aligned with actual experience. In addition, the Committee would like a clarification from the Department as to the actual levels of operation of LAMPF and Bevalac provided by the fiscal year 1984 budget request.

GENERAL SCIENCE AND RESEARCH—PROGRAM DIRECTION

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Program direction	$1,413	$2,250	0	$2,250
Summary: General science and research:				
Operating expenses	434,052	479,750	0	479,750
Capital equipment and construction	120,016	165,500	0	165,500
Total program	554,068	645,250	0	645,250

The fiscal year 1984 budget request for General Science Program Direction is $2.25 million. These funds are required to provide for the salaries, benefits, travel and other expenses associated with 35 full-time equivalents in the Office of the Associate Director for High Energy and Nuclear Physics and associated support staff required to administer these programs.

COMMITTEE ACTION

No change.

F. URANIUM ENRICHMENT

[Dollars in thousands]

	Fiscal year—		Committee action	
	1983 budget authority (estimate)	1984 DOE request	Changes to DOE request	Total authorization
Operating expenses:				
Gas centrifuge operations and support:				
Process development and demonstration and supporting services	$86,200	$106,400	+$11,000	$117,400
Advanced isotope separation technology	47,233	59,900	0	59,900
Subtotal operations	133,433	166,300	+11,000	177,300
Capital equipment:				
Gas centrifuge operations and support	3,800	3,400	0	3,400
Advanced isotope separation	2,500	9,500	0	9,500
Subtotal capital equipment	6,300	12,900	0	12,900
Construction:				
Advanced isotope separation:				
84-N-406, General Plant Project, various locations	0	1,200	0	1,200
84-N-407, Development/Demonstration Module (design only), Oak Ridge, TN	0	2,400	0	2,400
Prior-year projects	900	0	0	0
Subtotal, construction	900	3,600	0	3,600
Total	140,633	182,800	+11,000	193,800

The funding for the Uranium Enrichment program provides for operation of the government's gaseous diffusion plants at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. The funds also support construction of the Gas Centrifuge Enrichment Plant (GCEP) at Portsmouth, Ohio. This plant, when completed, will provide over 50 percent of the present required U.S. enrichment capacity. At present it is roughly 20 percent complete with manufacture of the first generation of centrifuge machines being done by Boeing, Garrett Air Research and Goodyear Aerospace. These Set III machines are demonstrated hardware whose unit cost is being lowered as more machines are built.

The DOE enrichment activity is run in such a way that enrichment revenues must cover all costs over a reasonable period of time. For the past two years, this activity has been constrained to match revenues with expenditures, that is, to limit expenditures to revenues received in each fiscal year rather than revenues over a reasonable period of time. This artificial constraint not only distorts the normal decision-making process, but there is some question as to whether this is an appropriate business-like approach for the United States to compete against foreign enrichment enterprises which include: EURODIF (France); a European consortium, URENCO; and the Soviet Union.

The uranium enrichment non-R&D activity is a program of shared jurisdiction with the Energy and Commerce & Interior and Insular Affairs Committees. In addition to Gas Centrifuge R&D, aimed at developing advanced centrifuges, the Committee also has exclusive jurisdiction over the Advanced Isotope Separation program which is directed toward demonstrating the promising Atomic Vapor Laser Isotope Separation (AVLIS) technique for enriching uranium. The Committee has historically encouraged acceleration of these advanced technologies to attain lower cost separative work units (SWU), the measure of uranium enrichment efficiency.

COMMITTEE ACTION

Gas Centrifuge Process Development & Demonstration and Supporting Services: +$11 million

The Committee recommends an increase of $11 million to accelerate Advanced Machine Development (AMD) of Set IV and Set V machines in order to arrive at lower cost technology at an earlier date.

Advanced Isotope Separation (AIS): No change.

COMMITTEE VIEW

Uranium enrichment

The Committee is concerned about the loss of the U.S. share of the foreign enrichment market. The Committee also recognizes that the costs in dollars per SWU for the U.S. enrichment services as projected with the Portsmouth Gas Centrifuge Plant (GCEP) online, are not directly indicative of the advantages of centrifuge technology. The Committee believes that the U.S. commitment to GCEP and the development of advanced enrichment technologies is important in terms of convincing the rest of the world that the United States is serious about being a reliable supplier. The Committee also recognizes that foreign competition in enrichment services are subsidized such that their pricing of such services is geared to increasing the market shares for foreign suppliers in the near-term.

The Committee recommends that the DOE conduct a comprehensive review of the pricing formula for uranium enrichment services including contributions from GCEP and ultimately, AIS technology. The Committee questions the validity of including imputed interest on the expenditures of the program when it is funded out of current revenues. It would seem that a phantom cost is being recovered at the expense of raising prices to non-competitive levels.

The Committee feels that the review should include an assessment of the maximum capability to accelerate advanced uranium enrichment technology development and deployment to drive down SWU costs in the late 1980's and beyond. However, the Committee recognizes that the maintenance of a competent industrial manufacturing infrastructure for the centrifuge machines is important, particularly for producing the advanced lower cost machines. The Committee encourages this review of the GCEP and AIS strategies recognizing that the ultimate goal is to lower U.S. enrichment costs without assuming unreasonable technological risks.

Among the various alternatives to be considered in this review, the Committee believes that the following should also be evaluated:

1. Assume that construction of buildings 3–8 of the Gas Centrifuge Enrichment Plant (GCEP) were to be delayed pending a choice between AIS and AGC technologies made in 1988, and evaluate the feasibility of bypassing or minimizing set III centrifuge technology in favor of set IV or set V technology for buildings 1 and 2 of GCEP. This evaluation should include:
   A. A comparison of the schedules and capital, operating, and resulting $/swu costs of completing buildings 1 and 2 with set III, set IV, or set V machines.
   B. An assessment of the feasibility and impact on domestic centrifuge manufacturing capability of (i) minimizing procurement of set III machines while maintaining the industrial infrastructure, (ii) cancelling the set III centrifuge purchase contracts and providing other incentives to retain the industrial infrastructure, and (iii) cancelling the set III centrifuge purchase contracts and providing no mechanism for maintaining the Industrial infrastructure.
   C. An analysis of the impact of the centrifuge options indentified in paragraph B on enrichment costs (in $/swu).
2. Provide comparative schedules and cost estimates for demonstration programs that would enable a choice to be made between AIS or AGC technologies for future enrichment capacity in January, 1987, 1988, or 1990. Comment on the risks involved in each of those deployment schedules and identify what, if any, program activities would have to be eliminated to accomplish the earlier deployments and what increased risks would thereby be incurred.
3. Provide schedules and capital, operating, and resulting $/swu cost estimates for replacing all existing enrichment capacity with centrifuge and AIS technology, assuming such technologies will be available on the existing and advanced schedules. Evaluate the preferred approach under the existing and advanced schedules and explain why it is the preferred approach.
4. Examine the impact on enrichment costs (in $/swu) of:
   A. Cancellation of GCEP.
   B. Completion of a 2 buildings GCEP with a minimum of set III machines and the rest with set IV and set V machines.
   C. Completion of a 2 building GCEP with set IV machines only.
   D. Completion of a 2 building GCEP with set V machines only.
   E. Completion of a 4, 6, and 8 building GCEP with set machines only.
   F. Completion of a 2-building GCEP with set IV and set V.
   G. Completion of GCEP as currently scheduled.

The DOE should report to the Committee on their review on all aspects of uranium enrichment program strategy and pricing by January 1, 1984.

V. EFFECT OF LEGISLATION ON INFLATION

In accordance with clause 2(1)(4), rule XI of the Rules of the House of Representatives, the following statement concerning the inflationary impact of H.R. 2587.

H.R. 2587 is assessed to have no significant inflationary effect on prices and costs in the operation of the national economy.

VI. COMMITTEE OVERSIGHT FINDINGS AND RECOMMENDATIONS

Pursuant to Rule XI, Clause 2(1)(3), of the Rules of the House of Representatives, and under the authority of Rule X, Clause 2(b)(1) and Clause 3(f), the results and findings from the Committee's oversight activities are incorporated in the recommendations found in the present bill and report.

VII. SUMMARY OF GOVERNMENT OPERATIONS COMMITTEE FINDINGS AND RECOMMENDATIONS

No findings and recommendations on oversight activity pursuant to Rule X, Clause 2(b)(2), and Rule XI, Clause 2(1)(3), of the Rules of the House of Representatives, have been submitted by the Committee on Government Operations for inclusion in this report.

VIII. BUDGET ANALYSIS AND PROJECTION—CONGRESSIONAL BUDGET ACT INFORMATION

This bill provides for new authorization rather than new budget authority and consequently the provisions of section 308(a) of the Congressional Budget Act of 1974 are not applicable.

IX. CBO ESTIMATES AND COMPARISONS

U.S. Congress,
Congressional Budget Office,
Washington, D.C., May 3, 1983.

Hon. Don Fuqua,
Chairman, Committee on Science and Technology,
U.S. House of Representatives,
Rayburn House Office Building, Washington, D.C.

Dear Mr. Chairman: Pursuant to Section 403 of the Congressional Budget Act of 1974, the Congressional Budget Office has prepared the attached cost estimate for H.R. 2587, the Department of Energy Civilian Research and Development Act for Fiscal Year 1984.

Should the Committee so desire, we would be pleased to provide further details on this estimate.

Sincerely,

Alice M. Rivlin, *Director.*

CONGRESSIONAL BUDGET OFFICE—COST ESTIMATE

1. Bill number: H.R. 2587.

2. Bill title: Department of Energy Civilian Research and Development Act for Fiscal Year 1984

3. Bill status: As ordered reported by the House Committee on Science and Technology, April 27, 1983.

4. Bill purpose: The bill authorizes the appropriation of $3.3 billion for fiscal year 1984 for the Department of Energy's civilian research and development program, superseding previous authorizations of $3.9 billion provided in the Omnibus Budget Reconciliation Act of 1981. (The Administration request for these programs for 1984 is $2.7 billion.) Research is authorized in fossil, conservation, solar, nuclear, and other energy areas. The bill authorizes no funding for continuation or termination of the Clinch River Breeder Reactor project for fiscal year 1984, except as provided in subsequent legislation.

5. Estimated cost to the Federal Government: The following table summarizes the change in authorization levels made by H.R. 2587, except for uranium enrichment.

[By fiscal years, in millions of dollars]

	1984	1985	1986	1987	1988
Authorization level:					
Function 250	645				
Function 270	2,449				
Total	3,094				
Less existing authorizations:					
Function 250	647				
Function 270	3,270				
Total	3,917				
Net change in authorization:					
Function 250	−2				
Function 270	−820				
Total	−822				
Net change in estimated outlays:					
Function 250	−7	6			
Function 270	−359	−348	−114		
Total	−366	−342	−114		

The bill also authorizes $193.8 million in spending for uranium enrichment research programs. The Omnibus Reconciliation Act of 1981 established an authorization level of approximately $3.0 billion for uranium enrichment programs for 1984. Since no specific authorization level was specified for uranium enrichment research programs, CBO cannot estimate the net change resulting from the authorization level established in this bill. The gross effect is shown below.

GROSS AUTHORIZATION FOR URANIUM ENRICHMENT RESEARCH AND DEVELOPMENT PROGRAM

[By fiscal years, in millions of dollars]

	1984	1985	1986	1987	1988
Budget estimate	193.8				
Outlays	137.9	45.4	10.5		

The costs of this bill fall within budget functions 250 and 270.

Basis of estimate: CBO assumes that all funds authorized will be appropriated and that spending will occur at rates experienced recently by programs authorized in this bill.

AUTHORIZATION LEVELS ESTABLISHED IN H.R. 2587 FOR FISCAL YEAR 1984

[In millions of dollars]

	Total	Operating	Plant, capital and construction
Fossil energy	310.4	303.9	6.5
Energy conservation	142.1	132.4	9.7
Energy supply	1,994.6	1,767.0	227.5
Solar	(198.9)	(197.4)	(1.5)
Nuclear	(542.5)	(495.8)	(46.7)
Other	(1,253.2)	(1,073.9)	(179.4)
Geothermal resources development fund	2.1	2.1	
General science	645.3	479.8	165.5
Uranium enrichment	193.8	177.3	16.5
Total	3,288.3	2,862.5	425.8

6. Estimated cost to State and local governments: None.
7. Estimate comparison: None.
8. Previous CBO estimate: None.
9. Estimate prepared by: Jeff Nitta.
10. Estimate approved by: C. G. Nuckols (for James L. Blum, Assistant Director for Budget Analysis).

X. CHANGES IN EXISTING LAW MADE BY THE BILL AS REPORTED

In Compliance with clause 3 of Rule XIII of the Rules of the House of Representatives, there are no changes in existing law made by the bill, as reported.

XI. COMMITTEE RECOMMENDATION

A quorum being present, the bill (H.R. 2587) was ordered reported on April 27, 1983 by the Committee by a roll call vote of 26–15.

XII. MINORITY VIEWS

FISCAL YEAR 1984 DEPARTMENT OF ENERGY AUTHORIZATION (H.R. 2587)

The Science and Technology Committee was faced with difficult decisions in developing an effective energy program for fiscal year 1984. The Department of Energy research and development authorization request continued the Administation's philosophy of emphasizing long term, high risk programs which appear to offer high payoff if successful. In addition to this general approach, which we endorse, significant increases were requested in funding for basic and fundamental research programs—the basic energy sciences, were requested in funding for basic and fundamental research nuclear physics, and high energy physics. However, there was an attendant reduction in support of solar, conservation, and fossil programs in an effort to hold total funding to an amount lower than fiscal year 1983. So the problem was that of supporting an energy research and development program which addressed all the energy alternative programs while maintaining a fiscally responsible spending level.

We believe that our energy problems and our economic problems cannot be separated from each other. Excessive federal spending reduces the amount of capital available for the private sector. Any reduction in capital available to the private sector, or increase in the cost of capital, will decrease the ability of individuals and corporations to undertake conservation programs and development of alternative energy resources. So a balance must be maintained in the government's involvement to ensure, on the one hand, an effective energy research and development program, and to provide, on the other hand, an intelligent funding level for that program.

In order to achieve both energy and economic goals, we offered in full Committee mark-up a substitute proposal which tempered the excesses of the Subcommittees' budgets. Our proposal provided a total of $2.97 billion for DOE research and development. It was a balanced energy budget, incorporating significant basic research increases over past years, maintenance of nuclear programs at previous levels, and continuation of alternative energy and conservation activities at meaningful rates. Our proposed funding level was at the amount appropriated by the Congress in fiscal year 1983, so we avoided adding to already huge deficit levels. However, our proposal was defeated and the Committee Majority voted for a budget (H.R. 2587) which exceeded the Administration request by $552 million. It is clear that the Majority completely disregarded the President's request. The Minority believes that the Administration's request should be given more credence. Additional support should be provided to programs only if the financial resources would permit and there are compelling reasons to do so. It is unfortunate that the members of the Majority view the budget request as a starting or "floor" level from which to increase funding and as an opportunity to protect projects, whose continuation is either unproductive, due to changes in the economic climate or national priorities, or no longer necessary.

In summary, we have offered a fiscally prudent, technically sound energy research and development budget as a substitute to an elevated version. We are concerned that our substitute was not accepted and are unable to justify the increased expenditures provided by H.R. 2587.

LARRY WINN, Jr.,
MANUEL LUJAN, Jr.,
ROBERT S. WALKER,
WILLIAM CARNEY,
F. JAMES SENSENBRENNER, JR.
JUDD GREGG,
RAYMOND J. MCGRATH,
JOE SKEEN,
CLAUDINE SCHNEIDER,
BILL LOWERY,
ROD CHANDLER,
HERBERT H. BATEMAN,
SHERWOOD L. BOEHLERT,
ALFRED A. MCCANDLESS,
TOM LEWIS.

ADDITIONAL VIEWS

Additional Views of Mrs. Lloyd, Messrs. Roe, Young, Carney, Skeen, Lowery, and McCandless

We believe it was a mistake for the Committee to recommend deletion of the authorization for fiscal year 1984 for the Clinch River Breeder Reactor Project that exists in the Omnibus Budget Reconciliation Act of 1981. The Committee should have adopted the Chairman's compromise proposal that would have preserved the current status of project activities as approved by the Congress in the Continuing Appropriations Act for fiscal year 1983. In that Act and the Chairman's proposal the DOE would have been directed not to proceed with permanent structures, pending congressional consideration of the refinancing plan, but would have been able to carry out any other activities deemed appropriate to continue the project schedule. Preserving this status quo would have been a more desirable and truly neutral approach.

The Subcommittee on Energy Research and Production will bring a bill before the Committee which will deal with the authorization and alternative financing of the Project. Those ideologically opposed to breeder reactors, and those simply opposed to CRBR, will then have an opportunity to vote on the cancellation of the Project once and for all. This, we believe, was a substantial commitment to be totally fair on this issue. Fairness and neutrality, however, are matters of perception. Those who offered and supported the amendment that was adopted in the Committee stated that it was only their intention to be neutral on CRBR and to encourage the Committee and the Congress to act on an alternative financing bill. In any event, the Committee seems to be in agreement that we must consider legislation that will either continue the project through completion under an alternative financing plan or terminate it.

The CRBR is most important because it is the focus of a thirty-year, $6.5 billion research and development effort to bring to commercial deployment a source of inexpensive and inexhaustible energy. It is not a prototype breeder plant, but it is the penultimate step in a research program that will ultimately show that a full-sized breeder reactor can be designed, engineered, constructed and licensed in this country.

Breeder reactor technology is not now, nor will it be after the Clinch River facility is built and operating, a commercial technolgy. It will take several decades before this energy option will be commercially deployable. Most cognizant scientists will unequivocally state that much more work will have to be done before breeders reach such a status. Yet the detractors of the technology would have us believe that we are usurping the commercial sector role in building this plant; and that we don't need it because it doesn't fit in the scheme of our nation's energy utilization needs. Nothing could be further from the truth. Our nation needs to have essentially inexhaustible energy resources available to it to support economic growth and a rising standard of living for everyone. There is no other way to feed our growing population and provide an enhanced quality of life for all the people in our society.

We are acutely aware of the relatively high cost to the government of completing the Clinch River Breeder Reactor which had an initial baseline design cost of about half its present projected cost. Even though there are all sorts of ways to show that CRBR's present total cost is really insignificant in comparison to the costs to be paid from an energy shortage, this does not ease the pain of the current recession nor lower the high projected deficits for our federal budget. All Members of Congress want to ease this pain in any small way that may be reasonably possible, and an alternative financing plan for the project will help reduce federal appropriations.

We are also hopeful that a reasonable and balanced perception of the government's role in assuring energy availability will prevail. There is undeniably an inherently high financial risk to the private sector in participating with the government in the construction and licensing of any large, first-of-a-kind project. We hope that a recognition of these facts, combined with a reasonable financing package for CRBR, will lead the Committee and the Congress to preserve our investment in research on breeder technology, through the focus of our breeder program, the Clinch River Breeder Reactor Project.

Marilyn Lloyd
Robert A. Roe
Robert A. Young
William Carney
Joe Skeen
Bill Lowery
Al McCandless

○